

## N O T I C E

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DOE/NASA CONTRACTOR  
REPORT

DOE/NASA CR-161558

DESIGN PACKAGE FOR SOLAR DOMESTIC HOT WATER SYSTEM

By Elcam, Inc.  
5330 Debbie Lane  
Santa Barbara, CA 93111

Under Contract NAS8-32245 with

National Aeronautics and Space Administration  
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy



(NASA-CR-161558) DESIGN PACKAGE FOR SOLAR  
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**U.S. Department of Energy**



**Solar Energy**

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## 1.0 INTRODUCTION

This Performance Specification establishes the requirements for the design and performance of the solar domestic hot water systems to be delivered. It designates the Interim Performance Criteria applicable to the above systems and defines any deviations, if required. The appendices specify the performance for each type and size system and the installation drawings.

## 2.0 APPLICABLE DOCUMENTS

### 2.1 Government Documents

Interim Performance Criteria for Solar Heating and Combined Heating/Cooling Systems and Dwellings, January 1, 1975. U.S. Department of Housing and Urban Development

### 2.2 Contractor Documents

Direct Heating System (Frost Cycle), Dwg. #ESS-3, 15 Nov 76.

Direct Dump Option, Dwg #ESS-5, 15 Nov 76.

### 2.3 Other Documents

## 3.0 APPLICATION OF INTERIM PERFORMANCE CRITERIA BY TYPE OF SYSTEM

The application of each paragraph of the Interim Performance Criteria to each type system is provided in the following table.



TABLE I

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY							
APPLICATION				TYPE SYSTEMS			
A - APPLICABLE TO SYSTEMS INDICATED I - APPLICABLE TO SYSTEM AND BUILDING NA - NOT APPLICABLE				H - HEATING HC - HEATING AND COOLING HW - HOT WATER			
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
1.1 H and HC System Performance	A	A	A	1.3.1 Collector Efficiency	A	A	A
1.1.1 Heating Design Temperatures	I	I	NA	1.4 Thermal Storage	A	A	A
1.1.2 Cooling Design Temperatures	NA	I	NA	1.4.1 Storage Capacity and Rate	A	A	A
1.1.3 Relative Humidity and Water Vapor Pressure	I	I	NA	1.5 Habitability of Occupied Spaces	A	A	A
1.1.4 Solar Contribution	A	A	A	1.5.1 Heat or Humidity Transfer Effects	I	I	I
1.1.5 Operation Impairment	A	A	A	1.6 Energy Transport Efficiency	A	A	A
1.2 HW System Subsystem Performance	A	A	A	1.6.1 Thermal Losses and Electrical Power	A	A	A
1.2.1 Water Design Temperature	I	I	I	1.7 Control	A	A	A
1.2.2 Storage Design Capacity	A	A	A	1.7.1 Installation and Maintenance	A	A	A
1.2.3 Solar Contribution	A	A	A	1.7.2 Manual Adjustment	A	A	A
1.2.4 Operational Impairment	A	A	A	1.7.3 Inhabited Space Temperature	A	A	NA
1.3 Collector Performance	A	A	A	1.7.4 Hot Water Temperature	A	A	A
				1.8 Auxiliary Energy	A	A	A
				1.8.1 Design Loads	A	A	A

TABLE I  
 CONTINUATION SHEET

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY							
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH				RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH			
TYPE SYSTEMS				TYPE SYSTEMS			
H	HC	HW		H	HC	HW	
2.1 System Design Conditions	A	A	A	2.3.2 Pressure Test: Potable Water	A	A	A
2.1.1 Equipment Capabilities	A	A	A	2.3.3 Air Transport Systems	A	A	A
2.1.2 Noise or Erosion-Corrosion	A	A	A	2.4 Collector Adjustment	A	A	A
2.1.3 Operating Conditions	A	A	A	2.4.1 Orientation and Tilt	A	A	A
2.1.4 Fluid Flow in Collectors	A	A	A	2.4.2 Mutual Shadowing	A	A	A
2.1.5 Entrapped Air	A	A	A	2.5 Subsystem Isolation	A	A	A
2.1.6 Thermal Expansion of Fluids	A	A	A	2.5.1 Shutdown in Multi-family Housing	A	A	A
2.1.7 Pressure Drops	A	A	A	2.6 Heat Transfer Fluid Quality	A	A	A
2.1.8 Condensate Removal	NA	A	NA	2.6.1 Liquid Quality	A	A	A
2.2 Mechanical Stresses	A	A	A	2.6.2 Air Quality	A	A	A
2.2.1 Vibration Stress Levels	A	A	A	2.6.3 Fluid Quality	A	A	A
2.2.2 Vibration from Moving Parts	A	A	A	2.6.4 Freezing Protection	A	A	A
2.2.3 Water Hammer	A	A	A	2.7 Piping Supports	A	A	A
2.2.4 Vacuum Relief Protection	A	A	A	2.7.1 Applicable Plumbing Standards	A	A	A
2.2.5 Thermal Changes	A	A	A	2.8 Excessive Pressure and Temperature Protection	A	A	A
2.2.6 Flexible Joints	A	A	A	2.8.1 Relief Valves and Vents	A	A	A
2.3 Leakage Prevention	A	A	A	3.1 Structural Design Basis	A	A	A
2.3.1 Pressure Test: Nonpotable Fluids	A	A	A	3.1.1 Applicable Standards	A	A	A

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CONTINUATION SHEET

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SPECIFICATION NO. SHC 3013  
REVISION  
DATE 19 Jan 77

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY							
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HO	IW		H	HO	IW
3.1.2 Service Loads	A	A	A	3.8.2 Constrain Loads	A	A	A
3.2 Failure Loads and Load Capacity	A	A	A	3.9 Ponding Condition	A	A	A
3.2.1 Ultimate Load Combinations	A	A	A	3.9.1 Design Provisions	A	A	A
3.2.2 Ice Loads	A	A	A	4.1 Plumbing and Electrical Installation	A	A	A
3.2.3 Vehicular Loads	I	I	I	4.1.1 Plumbing Codes	A	A	A
3.2.4 Load Capacity	A	A	A	4.1.2 Electrical Codes	A	A	A
3.3 Damage Control	A	A	A	4.2 Fail-Safe Controls	A	A	A
3.3.1 Resistance to Damage	A	A	A	4.2.1 System Failure Prevention	A	A	A
3.3.2 Glazing Design	A	A	A	4.2.2 Automatic Pressure Relief Valves	A	A	A
3.4 Cyclic Loads	A	A	A	4.3 Fire Safety	A	A	A
3.4.1 Deflection Limitations	A	A	A	4.3.1 Applicable Fire Standards	A	A	A
3.5 Cutting of Structural Elements	I	I	I	4.3.2 Penetrations through Fire Rated Assemblies	I	I	I
3.5.1 Design Provisions	I	I	I	4.4 Toxic	A	A	A
3.6 Creep and Residual Deflection	I	I	I	4.4.1 Provisions of Catch Basins	A	A	A
3.6.1 Deflection Limitations	I	I	I	4.4.2 Detection of Toxic and Flammable Fluids	A	A	A
3.7 Hail Resistance	A	A	A	4.5 Safety	I	I	I
3.7.1 Hail Size and Loading	A	A	A	4.5.1 Emergency Egress and Access	I	I	I
3.8 Constraint Loads	A	A	A	4.5.2 Identification and Location of Controls	A	A	A
3.8.1 Foundation Settlement	A	A	A	4.6 Protection of Potable Water and Circulated Air	A	A	A

TABLE I

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY									
APPLICATION					TYPE SYSTEMS				
A -- APPLICABLE TO SYSTEMS INDICATED					H -- HEATING				
I -- APPLICABLE TO SYSTEM AND BUILDING					HC -- HEATING AND COOLING				
NA -- NOT APPLICABLE					HW -- HOT WATER				
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS				
	H	HC	HW		H	HC	HW		
4.6.1 Contamination by Materials	A	A	A	5.2.4 Leakage	A	A	A		
4.6.2 Separation of Circulation Loops	A	A	A	5.2.5 Deterioration of Gaskets and Sealants	A	A	A		
4.6.3 Backflow Prevention	A	A	A	5.2.6 Transmission Losses Due to Outgassing	A	A	A		
4.6.4 Growth of Fungus	A	A	A	5.3 Chemical Compatibility of Components	A	A	A		
4.7 Excessive Surface Temperatures	A	A	A	5.3.1 Materials/Transfer Fluid Compatibility	A	A	A		
4.7.1 Protection from Heated Components	A	A	A	5.3.2 Corrosion of Dissimilar Materials	A	A	A		
5.1 Effects of External Environment	A	A	A	5.3.3 Corrosion by Leachable Substance	A	A	A		
5.1.1 Solar Degradation	A	A	A	5.3.4 Effects of Decom- position Products	A	A	A		
5.1.2 Soil Corrosion	A	A	A	5.4 Components Involving Moving Parts	A	A	A		
5.1.3 Airborne Pollutants	A	A	A	5.4.1 Wear and Fatigue	A	A	A		
5.1.4 Dirt Retention on Cover Plate Surface	A	A	A	6.1 Accessibility for Maintenance	A	A	A		
5.1.5 Abrasive Wear	A	A	A	6.1.1 Access for System Maintenance	A	A	A		
5.1.6 Fluttering by Wind	A	A	A	6.1.2 Access for System Monitoring	A	A	A		
5.2 Temperature and Pressure Resistance	A	A	A	6.1.3 Draining and Filling of Liquids	A	A	A		
5.2.1 Thermal Degradation	A	A	A	6.1.4 Flushing of Liquids Subsystems	A	A	A		
5.2.2 Deterioration of Heat Transfer Fluids	A	A	A	6.1.5 Filters	A	A	A		
5.2.3 Thermal Cycling Stresses	A	A	A	6.1.6 Potable Water Shutoff	A	A	A		

TABLE I

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY

Sheet 5 of 5

APPLICATION

A - APPLICABLE TO SYSTEMS INDICATED  
 I - APPLICABLE TO SYSTEM AND BUILDING  
 NA - NOT APPLICABLE

TYPE SYSTEM

H - HEATING  
 HC - HEATING AND COOLING  
 HW - HOT WATER

RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
6.2 Installation, Operation and Maintenance Manual	A	A	A	7.3.1 Space Use	I	I	I
6.2.1 Installation Instructions	A	A	A	7.3.2 Shading of Adjacent Structures	I	I	I
6.2.2 Maintenance and Operation Instructions	A	A	A	7.3.3 Impact on Environment	I	I	I
6.2.3 Maintenance Plan	A	A	A	7.3.4 View	I	I	I
6.2.4 Replacement Parts	A	A	A	8.1 Interference with Mechanical Operation	I	I	I
6.3 Repair and Service Personnel	A	A	A	8.1.1 Blockage of Solar Subsystem	I	I	I
6.3.1 Maintenance of H and HC Systems	A	A	A	8.1.2 Shading of Collector	I	I	I
6.3.2 Maintenance of HW System	A	A	A	8.1.3 Sensor Location	I	I	I
7.1 Design	I	I	I	8.2 Mechanical and Electrical Functioning of Dwelling and Site	I	I	I
7.1.1 Dwelling Design	I	I	I	8.2.1 Exhaust and Venting	I	I	I
7.1.2 Mobile Home Design	I	I	I	8.2.2 Utilities	I	I	I
7.1.3 Site Design	I	I	I	8.3 Mechanical and Electrical Functioning of Connections	I	I	I
7.1.4 Passive Use of Solar Energy	I	I	I	8.3.1 Plumbing Connections	I	I	I
7.2 Adequate Space	I	I	I	8.3.2 Electrical Connections	I	I	I
7.2.1 Collector Area	I	I	I	9.1 Structural Integrity	I	I	I
7.2.2 Storage Area	I	I	I	9.1.1 Movement in Adjacent Structures	I	I	I
7.2.3 Utility Chases	I	I	I	9.2 Structural Integrity of Dwelling	I	I	I
7.3 Functioning of Dwelling Site	I	I	I				

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REVISION 10 Jan 77  
DATE

RESIDENTIAL SYSTEMS, INTERIM PERFORMANCE CRITERIA SUMMARY							
RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS			RESIDENTIAL INTERIM PERFORMANCE CRITERIA PARAGRAPH	TYPE SYSTEMS		
	H	HC	HW		H	HC	HW
9.2.1 Loads	I	I	I	11.3.1 Material Compatibility	A	A	A
9.2.2 Penetration of Structural Members	I	I	I	12.1 Maintainability of H, HC, HW Systems	I	I	I
9.3 Structural Connections	I	I	I	12.1.1 Accessibility	I	I	I
9.3.1 Structural Connections	I	I	I	12.1.2 Misuse	I	I	I
9.3.2 Brittle Sub- system	I	I	I	12.1.3 Permanent Mainte- nance Accessories	I	I	I
9.3.3 Strength and Stiffness	I	I	I	12.2 Maintainability of Dwelling and Site	I	I	I
10.1 Safety of Dwelling and Site	I	I	I	12.2.1 Accessibility	I	I	I
10.1.1 Fire	I	I	I	12.2.2 Ice Dams	I	I	I
10.1.2 Accidents	I	I	I	12.3 Connections	I	I	I
11.1 Durability	I	I	I	12.3.1 Accessibility	I	I	I
11.1.1 Vegetation	I	I	I	13.1 Visual Character- istics of Dwelling and Site	I	I	I
11.2 Durability and Reliability of Dwelling and Site	I	I	I	13.1.1 Dwelling	I	I	I
11.2.1 Chemical Corrosion	A	A	A	13.1.2 Neighborhood	I	I	I
11.2.2 Heat and Moisture	I	I	I				
11.2.3 Exterior Penetrations	I	I	I				
11.3 Durability and Reliability of Connections	A	A	A				

4.0 DEVIATIONS FROM INTERIM PERFORMANCE CRITERIA

No deviations required.

5.0 GOVERNMENT FURNISHED PROPERTY

5.1 Site Data Acquisition Subsystem (SDAS) to be furnished.

6.0 GOVERNMENT DIRECTED REQUIREMENTS

7.0 GEOGRAPHIC AREA

7.1 Domestic hot water systems for single family residences are for installation in any region of the United States. Operating altitude is not restricted.

8.0 SYSTEM APPENDICES

8.1 Appendix A - Direct Heating System, Single Family Residence, Model Number 250C with Direct Dump Option.

8.2 Appendix B - Direct Heating System, Single Family Residence, Model Number 250C with Direct Dump Option.

## APPENDIX A

### 1.0 SYSTEM IDENTIFICATION

This Appendix defines the performance and installation drawings for domestic water heating systems, Model Number 250C with Direct Dump Option.

### 2.0 SYSTEM PERFORMANCE SHEETS

#### 2.1 Site

The system is to be installed in a single family residence located at the Encinitas Road Station, in the County of San Diego, State of California.

#### 2.2 Hot Water

Seventy-five gallons of potable hot water shall be delivered per day at temperatures no less than 140°F. Recovery rate shall be no less than 23.0 gallons/hour from 60°F. to 140°F. (based upon input to storage from the solar system and/or the operation of two installed 4.5 KW electric elements as necessary). The average hot water heating load will be  $1.79 \times 10^6$  BTU/month of which no more than 30% is provided by auxiliary energy on an annualized basis.

#### 2.3 Operating Requirements

The maximum electrical energy required to operate the complete solar system, excluding the two 4.5 KW elements, at its rated capacity shall be no greater than 0.150KW. The average yearly energy required to drive the system (including control energy) shall be no greater than 400 KWH.

\* Note: This figure is an annualized average based on an expected average system efficiency of 40%, a fixed tilt angle of 30°, and insolation data from La Jolla, California.



## 2.4 Physical Data

The following subsystems shall have

	Design Life	Weight (filled)	Installation
	<u>no less than</u>	<u>no greater than</u>	<u>Dimension</u>
Collector	10 years	3.1 lb/ft <sup>2</sup>	48-3/4"x96-3/4"x3-7/16"
Energy Transport Insulated Piping	10 years	.4 lb/li ft	1.625" dia
Pump	10 years	12 lb	4-7/8"x5"x7-5/16"
Controller	10 years	5 lb	6-3/4"x5-1/2"x2-1/4"
Pre-heat and Storage Tank	10 years	580 lb	58-1/4"x20-1/2"

## 3.0 INSTALLATION DRAWING SHEETS

<u>Drawing #</u>	<u>Title</u>
ESE-1	Collector
ESE-2	Solar Tank
ESE-3	Electric Tank
ESE-6	CASCADE Autocontrol
ESE-8	S106B Relay
ESE-9	CASCADE Valve
ESE-15	Pump - Grundfos 25-42-SF

4.0 EXISTING MODEL 250C consists of the following:

1. 64 sq. ft. total area (60 sq. ft. effective absorber area) in two collectors of header configuration with an efficiency as described in Figure 1.1, page 2 of the updated proposal dated 9 June 76.
2. 104 gallons of storage capacity in two tanks. The heat loss at design temperatures is 246 BTU/ hr. from each tank.
3. A control system as described in the proposal and update.
4. A transport system with approximately sixty feet of 3/4 in., Type M copper tubing (7/8 inch O.D.) covered with 1-5/8 inch O.D. insulation (3/8 inch wall). The flow rate is 2.5 gpm.
5. Direct Dump System which includes: three port DD valve; pressure switch; vacuum relief valve; check valve; air vent valve; Direct Dump electronics package.

5.0 Solar insolation for which the existing system is rated against are data from Santa Maria, California, found on page 17 of ASHRAE's Low Temperature Engineering Application of Solar Energy (1967). In addition, since 19 September 76, insolation in the plane of the collectors has been measured and recorded at the Operating Prototype.

## APPENDIX B

### 1.0 SYSTEM IDENTIFICATION

This Appendix defines the performance and installation drawings for domestic water heating systems, Model Number 250C with Direct Dump Option.

### 2.0 SYSTEM PERFORMANCE SHEETS

#### 2.1 Site

The system is to be installed at Arizona State University Farm House #1, Tempe, Arizona 85281.

#### 2.2 Hot Water

Seventy-five gallons of potable hot water shall be delivered per day at temperatures no less than 140°F. Recovery rate shall be no less than 23.0 gallons/hour from 60°F. to 140°F. (based upon input to storage from the solar system and/or the operation of two installed 4.5KW electric elements as necessary). The average hot water heating load will be  $1.79 \times 10^6$  BTU/month of which no more than 15%\* is provided by auxiliary energy on an annualized basis.

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\* Note: This figure is an annualized average based on an expected average system efficiency of 40%, a fixed collector tilt angle of 30°, and insolation data from Phoenix, Arizona.

## 2.4 Physical Data

The following subsystems shall have

	Design Life	Weight (filled)	Installation
	<u>no less than</u>	<u>no greater than</u>	<u>Dimension</u>
Collector	10 years	3.1 lb/ft <sup>2</sup>	48-3/4"x96-3/4"x3-7/16"
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3. A control system as described in the proposal and update.
4. A transport system with approximately sixty feet of 3/4 in., Type M copper tubing (7/8 inch O.D.) covered with 1-5/8 inch O.D. insulation (3/8 inch wall). The flow rate is 2.5 gpm.
5. Direct Dump System which includes: three port DD valve; pressure switch; vacuum relief valve; check valve; air vent valve; Direct Dump electronics package.

5.0 Solar insolation for which the existing system is rated against are data from Santa Maria, California, found on page 17 of ASHRAE's Low Temperature Engineering Application of Solar Energy (1967). In addition, since 19 September 76, insolation in the plane of the collectors has been measured and recorded at the Operating Prototype.

AS INSTALLED DRAWING LIST - PHOENIX

CONTRACT NAS8-32245

ESC-12

SUNSPOT CASCADE SOLAR DOMESTIC WATER HEATING SYSTEMS

ELCAM, INC.

SANTA BARBARA, CA.

AUGUST 1977

LEVEL S - SYSTEM CONFIGURATIONS

S5 Direct Dump Option

DRAWING NUMBER

ESS-5

PAGE NR

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LEVEL E - ELEMENTS

E1 Collector

ESE-1

28/29

E2 Solar Tank

ESE-2

30

E3 Electric Tank

ESE-3

31

E9 CASCADE Valve

ESE-9

32

E15 Pump- Grundfos UP25-42SF

ESE-15

E18 Pump Assembly

ESE-18

E19 CASCADE Autocontrol Assembly

ESE-19

Drawing List  
Contract NAS8-32245

LEVEL P - PARTSDRAWING NUMBER   Page NrCOLLECTOR

CP1	Absorber Snap Fin	ESP-C1	33
CP2	Absorber Waterway	ESP-C2	34
CP3	Side Channel	ESP-C3	35
CP4	Cove Strip	ESP-C4	36
CP5	Cross Channel	ESP-C5	37
CP6	Absorber Restraint	ESP-C6	38
CP7	Gaskets	ESP-C7	39
CP8	Cover - Galsteel	ESP-C8	40
CP9	Fiberglass Cover Assembly	ESP-C9	41
CP10	Rubber Grommet	ESP-C10	42
CP11	Rear Insulation/Aluminum Sheet	ESP-C11	43
CP12	Side Insulation	ESP-C12	44
CP13	Pop Rivets	ESP-C13	45
CP14	Corner Brackets	ESP-C14	46
CP15	Label	ESP-C15	47
CP16	Waterway Cap	ESP-C16	48
CP17	Channel Box Assembly	ESP-C17	49/50
CP18	Backing Sheet	ESP-C18	51
CP19	Sealant	ESP-C19	52
CP20	Sealing Tape	ESP-C20	53

Drawing List  
Contract NAS8-32245



<u>AUTOCONTROL</u>	<u>DRAWING NUMBER</u>	<u>Page Nr</u>
AP1 Cover	ESP-A1	54/55
AP2 Label - Autocontrol	ESP-A2	56
AP3 Base Plate	ESP-A3	57
AP4 Stand Off	ESP-A4	58
AP5 Heat Sink	ESP-A5	59
AP6 Screw - Self Tapping	ESP-A6	60
AP8 Printed Wiring Board Assembly	ESP-A8	61
AP9 I.C. Socket	ESP-A9	62
AP10 I.C. LM 324N - Quad Op Amp	ESP-A10	63
AP11 I.C. CD 4011 Logic Chip	ESP-A11	64
AP12 Transistor 2N 4401	ESP-A12	65
AP13 Transistor 2N4403	ESP-A13	66
AP14 Triac (Thyristor) 2N6070A	ESP-A14	67
AP15 Regulator UA7812	ESP-A15	68
AP16 Relay LCIC-UA-DC12	ESP-A16	69
AP17 Switch SPST	ESP-A17	70
AP18 Switch, Center Off SPDT	ESP-18	71
AP19 Diode IN 4002	ESP-A19	72
AP20 ZENER Diode IN 5231B	ESP-A20	73
AP21 LED Lamp	ESP-A21	74
AP23 Fuse	ESP-A23	75
AP24 Capacitor 1000 MF	ESP-A24	76
AP25 Capacitor 100 MF	ESP-A25	77
AP28 Resistor 20K	ESP-A28	78
AP29 Resistor 75K	ESP-A29	79

Drawing List  
Contract NAS8-32245

AUTOCONTROL (continued)

AP30	Resistor 5.11K	ESP-A30	80
AP31	Resistor 0.8K	ESP-A31	
AP32	Resistor 2.0K	ESP-A32	81
AP33	Resistor 1.2K	ESP-A33	
AP34	Resistor 1.0K	ESP-A34	82
AP35	Resistor 10 K	ESP-A35	83
AP36	Resistor 0.39K	ESP-A36	84
AP37	Resistor 100K	ESP-A37	85
AP38	Resistor 2.2K	ESP-A38	86
AP39	Resistor 0.68K	ESP-A39	87
AP40	Resistor 2K	ESP-A40	
AP41	Resistor 4.75K	ESP-A41	88
AP42	Resistor 4.64K	ESP-A42	89
AP43	Resistor 4.87K	ESP-A43	
AP44	Resistor 160K	ESP-A44	90
AP45	Potentiometer	ESP-A45	91
AP46	Square Barrel Terminal	ESP-A46	92
AP48	Screw, Pan Head	ESP-A48	93
AP51	Nut Hex	ESP-A51	94
AP52	I.C. LM3911 Sensor	ESP-A52	95

Drawing List  
NAS8-32245

AUTOCONTROL (continued)DRAWING NUMBERPage Nr.

AP53	Sensor Cartridge	ESP-A53	96
AP54	Resistor - Calibration	ESP-A54	97
AP57	Sensor Cable Assembly	ESP-A57	98
AP58	Flag Terminal	ESP-A58	99
AP60	Washer - Flat	ESP-A60	100
AP61	Insulation Shrinkable	ESP-A61	101
AP62	Cable	ESP-A62	102
AP63	Casting Compound - Epoxy	ESP-A63	103
AP64	Label Circuit Board	ESP-A64	104
AP65	Label, Control	ESP-A65	105
AP66	Washer, Flat	ESP-A66	106
AP67	Washer, Lock Spring	ESP-A67	107
AP68	Lead Set	ESP-A68	108/109
AP69	Mounting Bracket	ESP-A69	
AP71	Switch, Low Pressure	ESP-A71	110
AP72	Wiring Diagram, Direct Dump Valve	ESP-A72	111
AP73	Circuit Board Assembly, Direct Dump	ESP-A73	
AP75	Lead Set "A"	ESP-A75	
AP76	Standoff, Male-Female	ESP-A76	
AP77	Cable, Direct Dump	ESP-A77	
AP78	Cable, Pressure Switch	ESP-A78	
AP79	Fuseholder	ESP-A79	
AP80	Bracket Strain Relief	ESP-A80	
AP81	Capacitor, 2.2 MF	ESP-A81	
AP82	Capacitor, .012 MF	ESP-A82	
AP83	Capacitor, .033 MF	ESP-A83	

Drawing List  
Contract NAS8-32245

AUTOCONTROL (Continued)DRAWING NUMBERPage Nr

AP84	Capacitor, 2200 MF	ESP-A84	
AP85	Resistor 3.3K	ESP-A85	
AP86	Resistor, 3.3M	ESP-A86	
AP87	Resistor, .12K	ESP-A87	
AP88	Transformer	ESP-A88	
AP89	Relay, DPDT	ESP-A89	
AP90	Box, Electric	ESP-A90	
AP91	Circuit Board Assembly	ESP-A91	
AP92	Circuit Board Assembly, Dump Option	ESP-A92	
AP93	Cable	ESP-A93	
AP94	Cable, Power, 24V	ESP-A94	

STORAGE TANK

TP2	Sensor Restraint Plate	ESP-12	112
TP5	Gasket	ESP-15	113

LEVEL I - INSTALLATION

11	Pipe Hanger	ESI-1	114
12	Check Valve	ESI-2	115
13	P & T Valve	ESI-3	116
15	Gate Valve	ESI-5	117
16	Pressure Relief Valve	ESI-6	118
17	Housing	ESI-7	119

LEVEL I - INSTALLATION (continued)

	<u>DRAWING NUMBER</u>	<u>Page Nr</u>
I10 Cable Connector	ESI-10	
I12 Tempering Valve	ESI-12	120
I13 S106B Relay Assembly	ESI-13	
I14 Vent Valve, Air	ESI-14	121
I15 Check Valve	ESI-15	122

Drawing List  
Contract NAS8-32245

SAN DIEGO  
DRAWING LIST  
CONTRACT NAS8-32245  
ESC-7a-S.D.

SUNSPOT CASCADE SOLAR DOMESTIC WATER HEATING SYSTEM

ELCAM, INC.  
SANTA BARBARA, CA  
REVISED APRIL 1978

<u>LEVEL S - SYSTEM CONFIGURATIONS</u>		<u>DRAWING NUMBER</u>	<u>Page Nr</u>
58	SUNSPOT Gas Cascade	ESS-8	123

<u>LEVEL E - ELEMENTS</u>			
E1	Collector	ESE-1	28/29
E2	Solar Tank	ESE-2	30
E3	Electric Tank	ESE-3	31
E4	Gas Tank	ESE-4	124
E9	CASCADE Valve	ESE-9	32
E15	Pump - Grundfos UP25-42SF	ESE-15	
E20	CASCADE Model #150 Autocontrol Assembly	ESE-20	

Drawing List  
Contract NAS8-32245

LEVEL P - PARTSDRAWING NUMBERPage NrCOLLECTOR

CP1	Absorber Snap Fin	ESP-C1	33
CP2	Absorber Waterway	ESP-C2	34
CP3	Side Channel	ESP-C3	35
CP4	Cove Strip	ESP-C4	36
CP5	Cross Channel	ESP-C5	37
CP6	Absorber Restraint	ESP-C6	38
CP7	Gaskets	ESP-C7	39
CP10	Rubber Grommet	ESP-C10	42
CP11	Rear Insulation/Aluminum Sheet	ESP-C11	43
CP12	Side Insulation	ESP-C12	44
CP13	Pop Rivets	ESP-C13	45
CP14	Corner Brackets	ESP-C14	46
CP15	Label	ESP-C15	47
CP16	Waterway Cap	ESP-C16	48
CP17	Channel Box Assembly	ESP-C17 2 sheets	49/50
CP18	Backing Sheet	ESP-C18	51
CP19	Sealant	ESP-19	52
CP20	Sealing Tape	ESP-C20	53
CP21	Glass Cover	ESP-C21	125

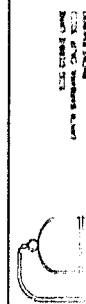
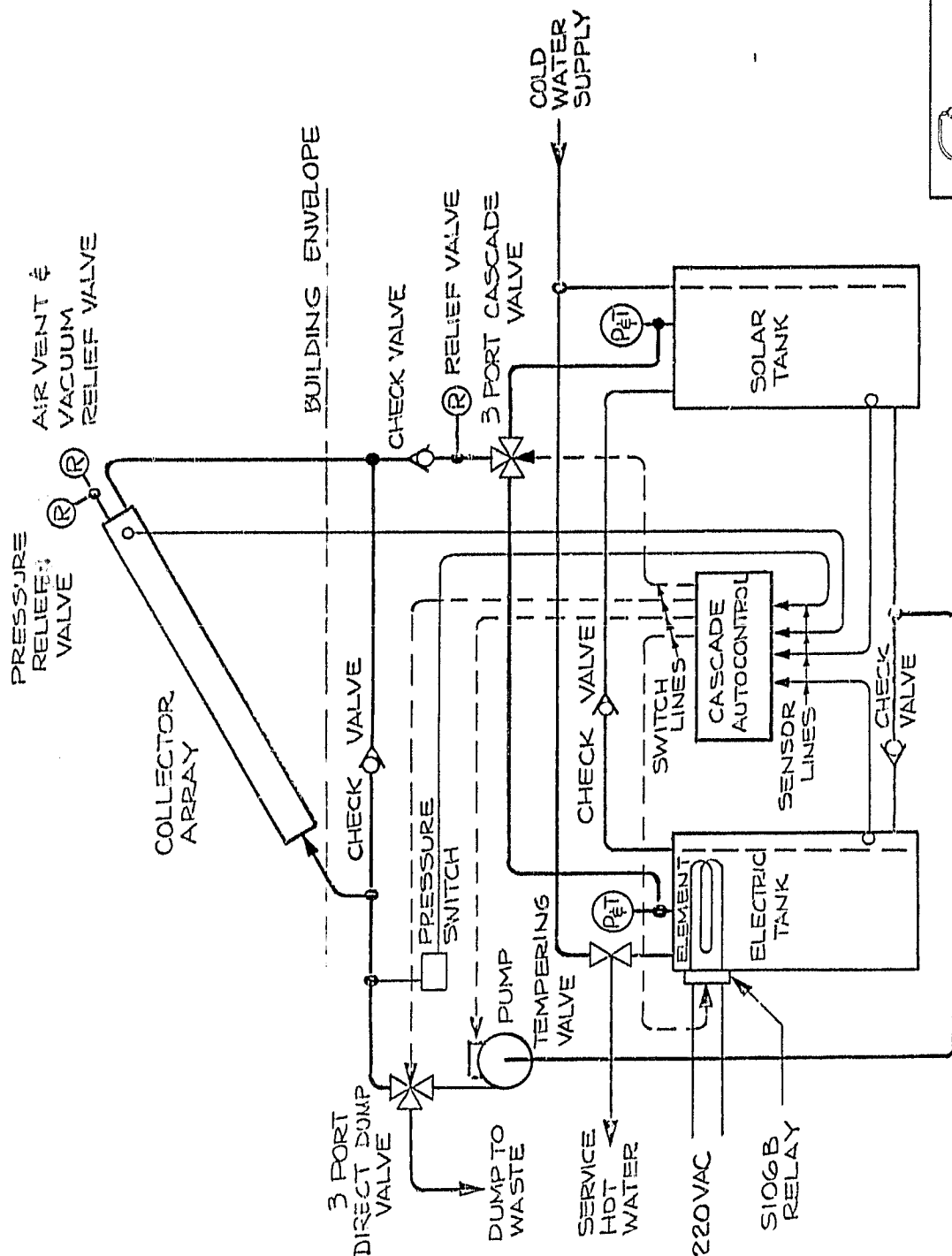
Drawing List  
Contract NAS8-32245



LEVEL I - INSTALLATIONDRAWING NUMBERPage Nr

11	Pipe Hanger	ESI-1	114
12	Check Valve	ESI-2	115
13	P & T Valve	ESI-3	116
15	Gate Valve	ESI-5	117
16	Pressure Relief Valve	ESI-6	118
17	Housing	ESI-7	119
19	Flexible Connection	ESI-9	
110	Cable Connector	ESI-10	
114	Vent Valve, Air	ESI-14	121

Drawing List  
Contract NAS8-32245



**ELEGAM, INC.**  
 1000 W. BROADWAY, SUITE 100  
 NEW YORK, N.Y. 10013

DATE	REV	BY	CHK	APP
10/15/83	1	J. J. J.	J. J. J.	J. J. J.
DIRECT DUMP OPTION				
NONE				
ESS-5				

ORIGINAL PAGE IS  
 OF POOR QUALITY

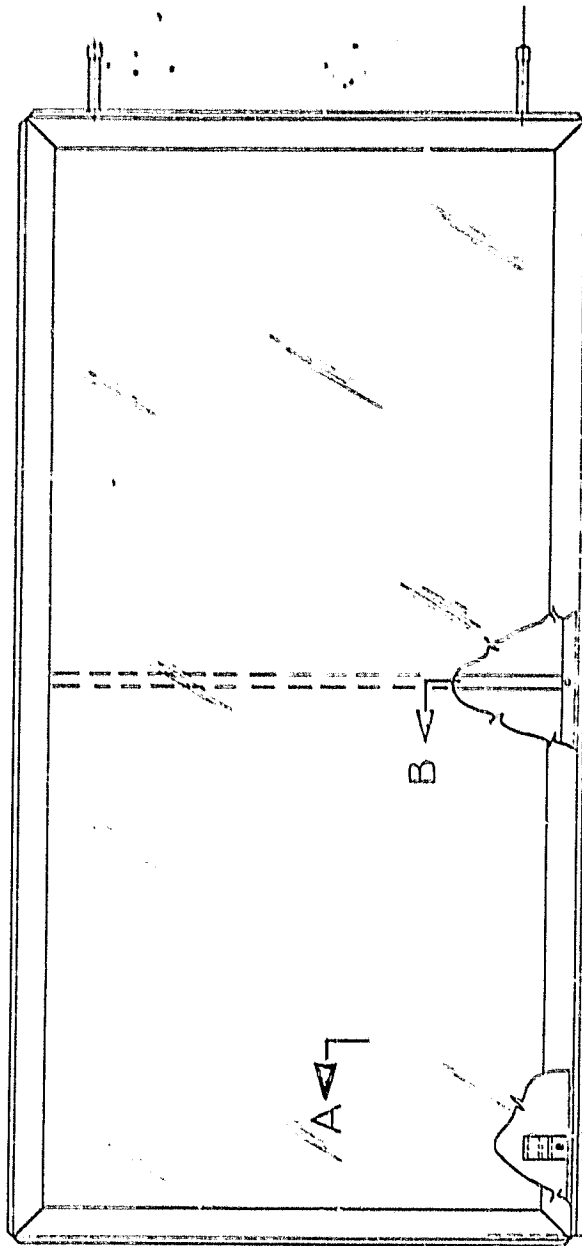
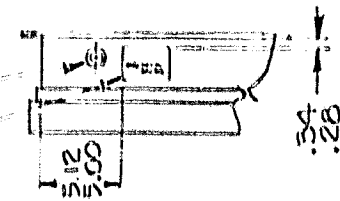
NOTES:

1. ASSEMBLE PER ENGINEERING SPEC

2. INSTALL LABEL IN LOCATION SHOWN MARK WITH MOD NO. & SER NO.

2 REQD CP-0-001  
GROUNNET

CP-5  
LABEL



INSIDE SURF

18.0  
15.0

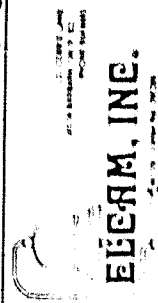
TYP 4 CORNERS

SEE  
SH 2

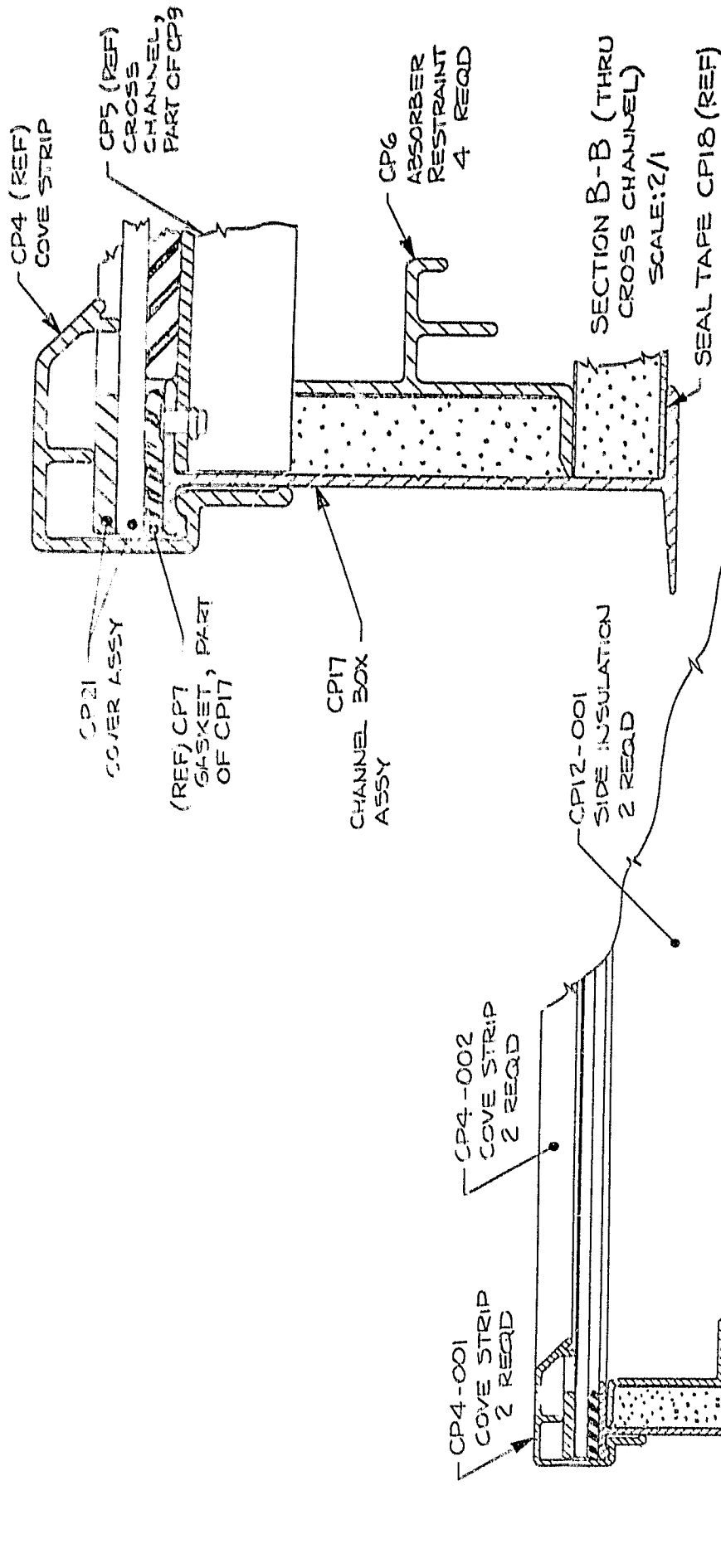
SEE SH 2

CP-0 (REF)  
SEE

SHEET 1 OF 2



DATE	REV	BY	CHKD	APPD
COLLECTOR ASSY				
ELEGANT, INC.				
AIR SEALS				



SHEET 2

ELCAM, INC.  
 1000 S. 10TH AVE.  
 DENVER, CO 80202  
 (303) 733-1111

NO.	REV.	DATE	BY	CHKD.	APP.
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

COLLECTOR ASSY  
 ESE-1

NOTES:

1. MATERIAL:  
GLASS-LINED TANK  
STORAGE OR HEATER  
MODEL, SEE TABLE I

2. VENDOR:

AC SMITH CORP  
FROM NO. 28611

3. PART NO. MUST INCLUDE  
THE DASH NO.

E: E2-001

CODE

A = RELIEF VALVE  
OPENING 3/4 NPT  
B = OUTLET 3/4 NPT  
C = INLET 3/4 NPT  
D = DRAIN VALVE  
E = 3/4 FEMALE NPT  
F = ELECTRICAL ENTRANCE  
ESH MODELS

ESH MODELS  
ELEVATION LOCATION

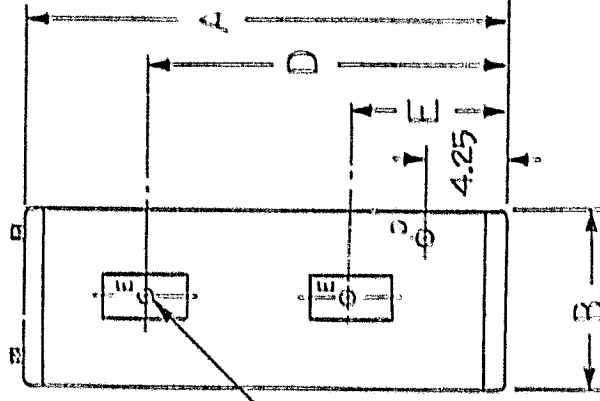
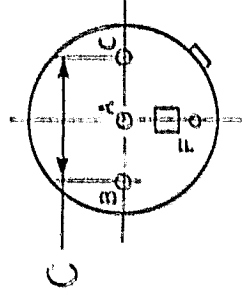
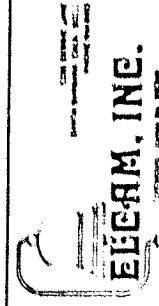


TABLE I

SOLAR STORAGE TANK			SOLAR ELECTRIC HEATER				APPROX		A		B		C		D		E	
PART NO.	MODEL	CAP. U.S. GAL	PART NO.	MODEL	CAP. U.S. GAL	MAX. KW @ 200/210/220V/240V/250V	S-P	LES										
E2-001	STJ-30	30	E2-011	ESH-30	30	3	111	49.2	20.5	3	31.94	7.75						
E2-002	STJ-40	40	E2-012	ESH-40	40	3	134	47.88	21.75	3	31.75							
E2-003	STJ-52	52	E2-013	ESH-52	52	3	152	59.35	21.75		41.5							
E2-004	STJ-66	66	E2-014	ESH-66	66	3	196	63.88	24		45.75							
E2-005	STJ-80	80	E2-015	ESH-80	80	3	228	62.88	25.25	Y	46.75							
E2-006	STJ-120	120	E2-016	ESH-120	120	3	355	62.12	27.38	16	46.75	Y						



E2

NO.	DESCRIPTION	QTY.	UNIT PRICE	TOTAL
1	SOLAR STORAGE TANK			
2	SOLAR HEATER TANK			
3	RELIEF VALVE			
4	OUTLET VALVE			
5	INLET VALVE			
6	DRAIN VALVE			
7	3/4 FEMALE NPT			
8	ELECTRICAL ENTRANCE			
9	APPLY			

ESE-2

# NOTES:

## 1. MATERIAL:

GLASS-LINED  
WATER HEATER  
MODEL, SEE TABLE I

## 2. VENDOR:

AO SMITH CORP  
FSCM NO. 28611

NO. OF ELEMENTS = 2

MAX KW@ 240V = 12

DOUBLE ELEMENT =  
4500W/4500W

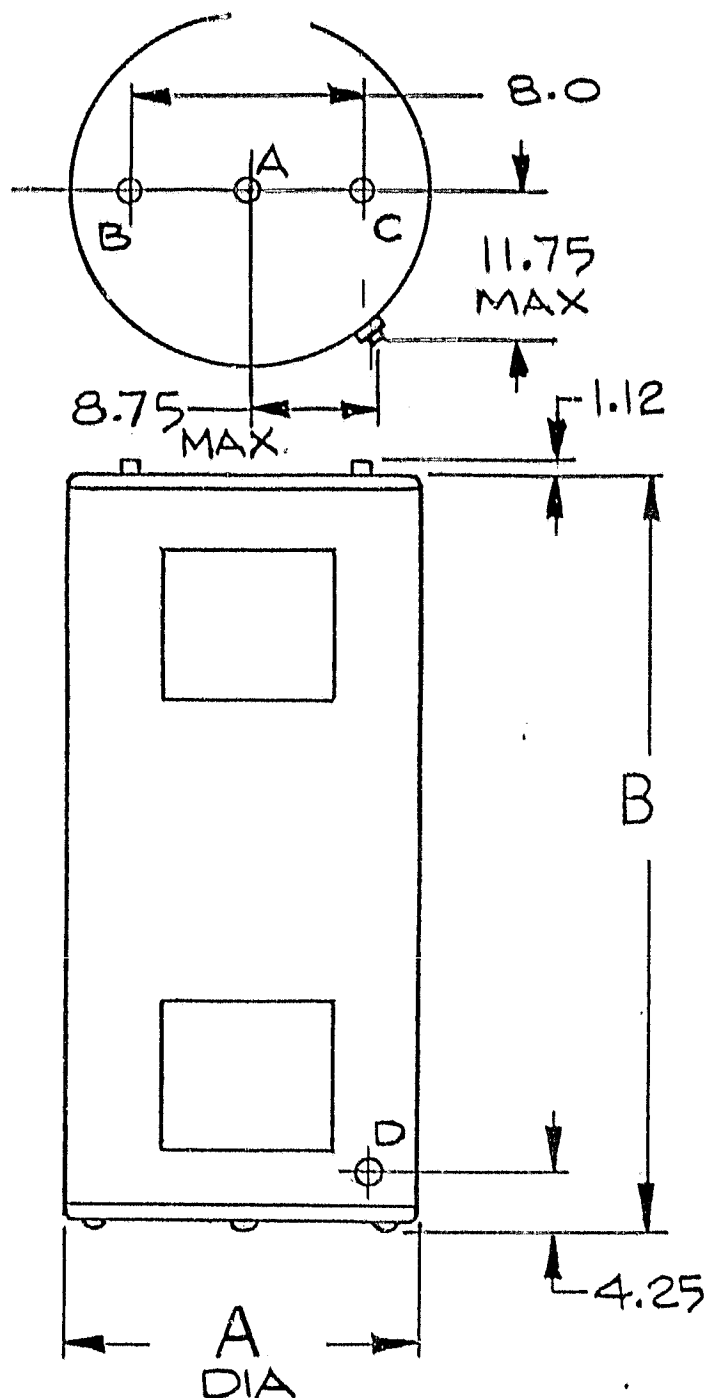
TABLE I

SPECS	-001	-002
MODEL	PEC-52	PEC-40
CAP IN GALS	52	40
SHIP WT/LBS	148	188
DIM A	20.5	24.0
DIM B	58.25	61.75

## CODE

A = RELIEF VALVE  
OPENING 3/4 NPT  
B = OUTLET 3/4 NPT  
C = INLET 3/4 NPT  
D = DRAIN VALVE

NOTE: PART NO. MUST  
INCL DASH NO.,  
ie: E3-001



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES	REVISIONS			PART NUMBER	
	NO	DATE	BY	E3	
UNLESS OTHERWISE SPECIFIED DECIMAL	1			PART NAME	
XX ± 0.0	2				
.XXX ± 0.0	3			ELECTRIC TANK	
ANGULAR ±	4				
DRAFT	5			DRAWN BY	
VENDORS TOX APPLY					
				THOMSON	
				SCALE NONE	
				DATE 23 NOV 16	
				DRAWING NO	
				ESE-3	

## 1. MATERIAL:

2. JENCO:

### 3. SPECIFICATIONS:

FOR 40°F TO 125°F WATER

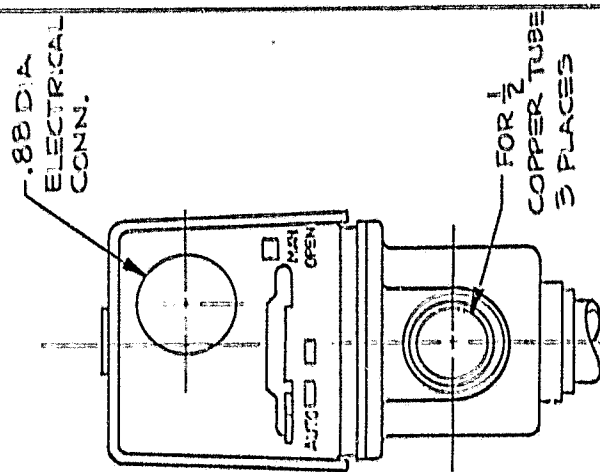
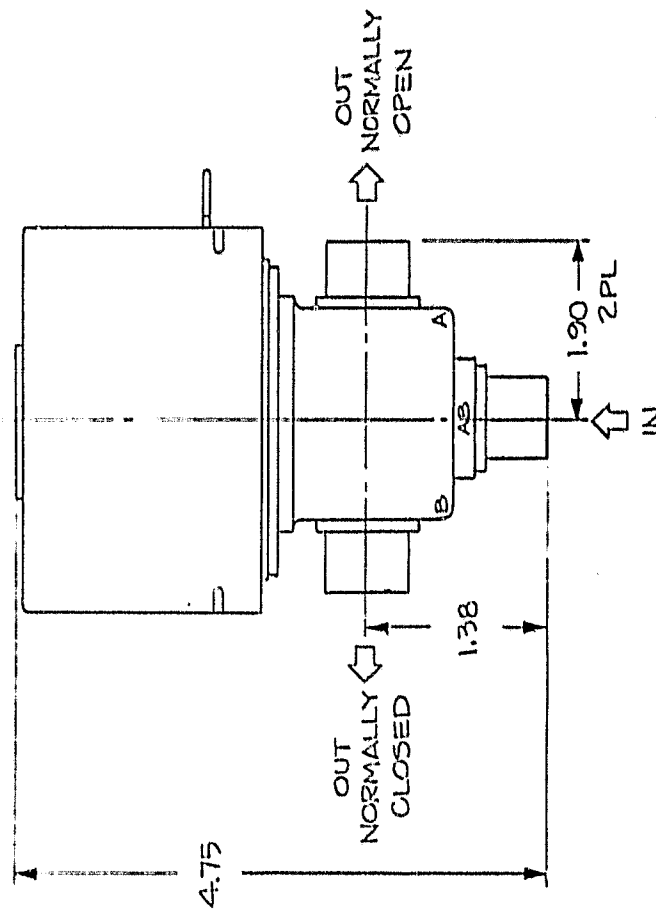
25°F MAX AMBIENT

MOTOR 24VAC 60 HZ

5W 624M

MAX DIFFERENTIAL PRESS IOPSI

MAX STATIC PRESSURE= 125 PSI



THE GREAT GUY  
BANDS THROUGHOUT THE WORLD

**ELERM, INC.**

**SECRET**

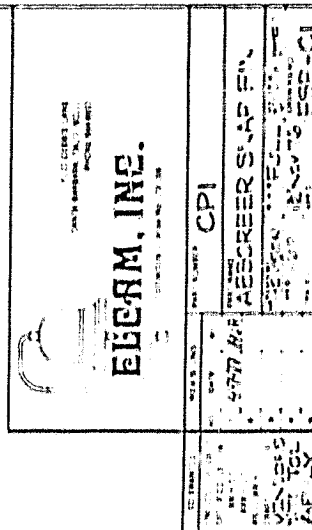
[illegible]

WATSON!

2. VENDOR:

### 3. PROTECTIVE FINISH:

BLACK  
FINISH THIS  
SURFACE, SEE  
NOTE 3





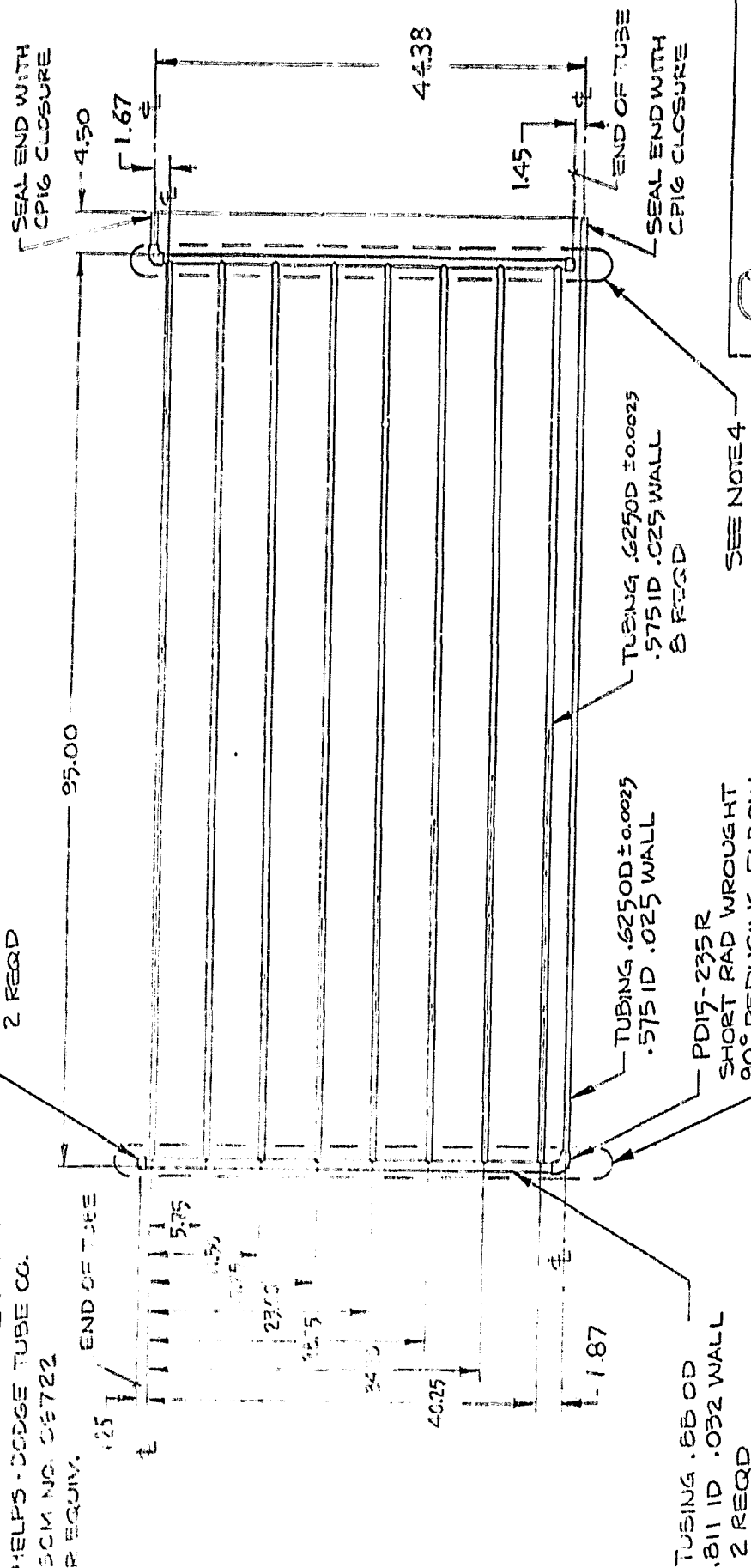
750-44

COPPER TUBE, ROUND SEAMLESS, HARD  
DRAWN, TYPE M - OPTION ALLOY 330.

2. ALL SEAMS SHALL BE BRAZED USING "UNIBRAZE" 45% SILVER ALLOY.

PD 15-154  
WROUGHT COPPER  
END CAP  
2 REQD

3. PD'S FINDINGS ARE FROM:  
 PHELPS-DODGE TUBE CO.  
 PSCN NO. C5722  
 OR EQUIV.



NOTES CONTINUED:

4. AFTER FABRICATION & TESTING  
TREAT INDICATED AREAS PER  
ENGINEERING SPEC



© 2001 by the International Council  
for the Exploration of the Sea

**ELI LILLY & CO.**

**Figure 1**

202

# AESCRBER WATERWAY

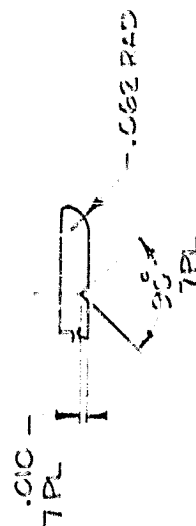
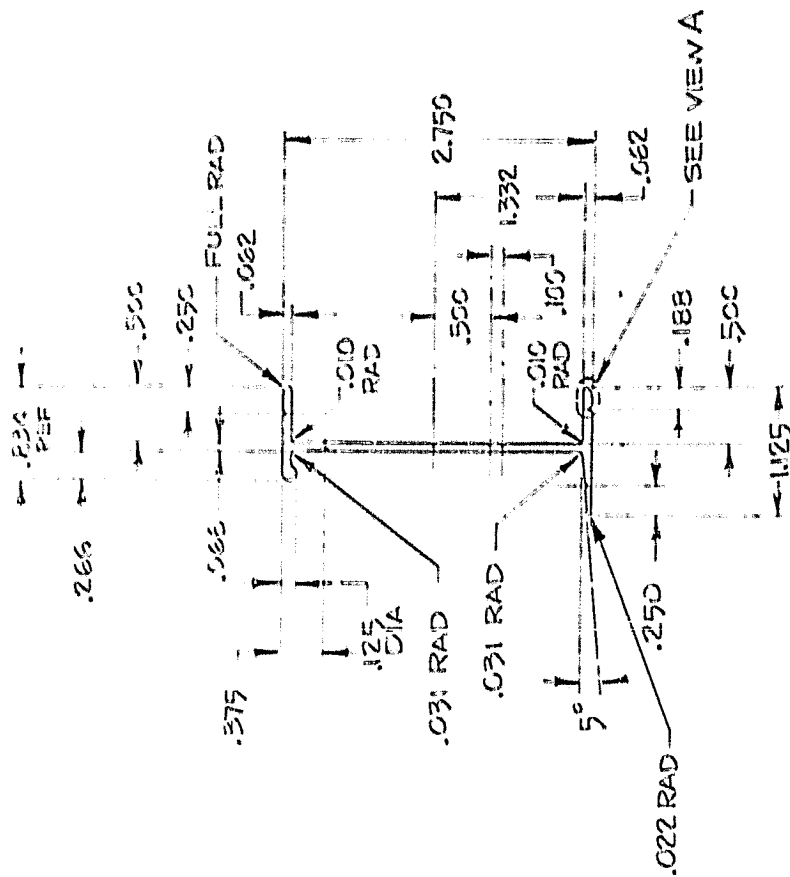
[illegible]

L. V. 11.11.11

2. 10. 502:

REYNOLDS METAL CO.  
PSC 400.

三、四、五、六、七、八、九、十

ELECTRO-DEPOSITED  
CONVERSION DARK  
BROWN

VIEW A  
SCALE: 1/8"

**ELIEM, INC.**

[illegible]

THE UNIVERSITY OF CHICAGO

100-443881-103

10

2. VERBODEN

3. PROTECTIVE FINISH:  
ELECTRO-DEPOSITED  
COMMERCIAL DARK  
BROWN



**ELCMI INC.**  
A Division of  
Elcom, Inc.  
10000 Elcom Drive  
Elcom, Inc.  
10000 Elcom Drive  
Elcom, Inc.

1992

**VENDOR**

CP4	COVE STRIP
-----	------------

## I. MATERIAL:

CMPEN 6063 TEMPER T52

DIE SECTION NO. 8997 (ALCA)

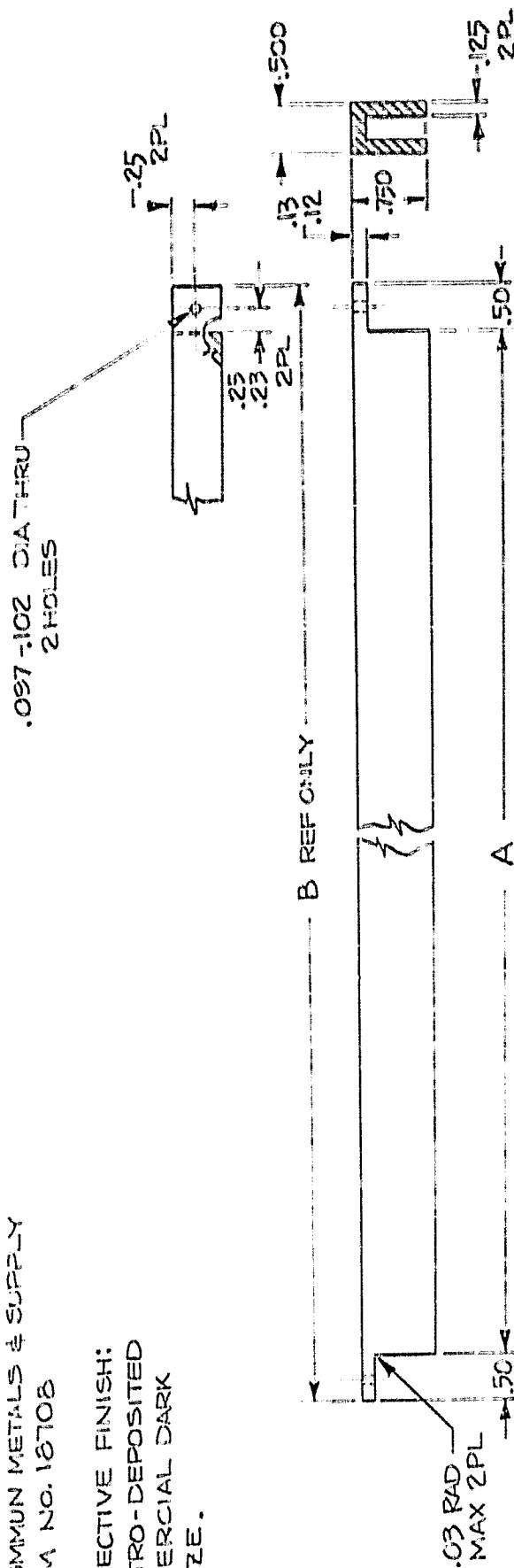
DU COMMUN METALS & SUPPLY

FSCN 20.18708

ELECTRO-DEPOSITED

COMMERCIAL DARK

BRONZE.



12-13-71

PART NO.	NOTCHED LENGTH	CUT LENGTH	B REF	REMARKS
CP5-001	46.79	47.76		

**ELECTRAM, INC.**

05

# STAYSAFE

115  
116  
117  
118  
119

卷之四

ALUM. NUM. ALLY EXTRUSION  
COMPEN 6063 TEMPER T5  
DIE SECTION NO. 67106

2. VENDOR:

REYNOLDS METALS CO.  
FSCM NO. 09983

25-15000-3

3-10-10

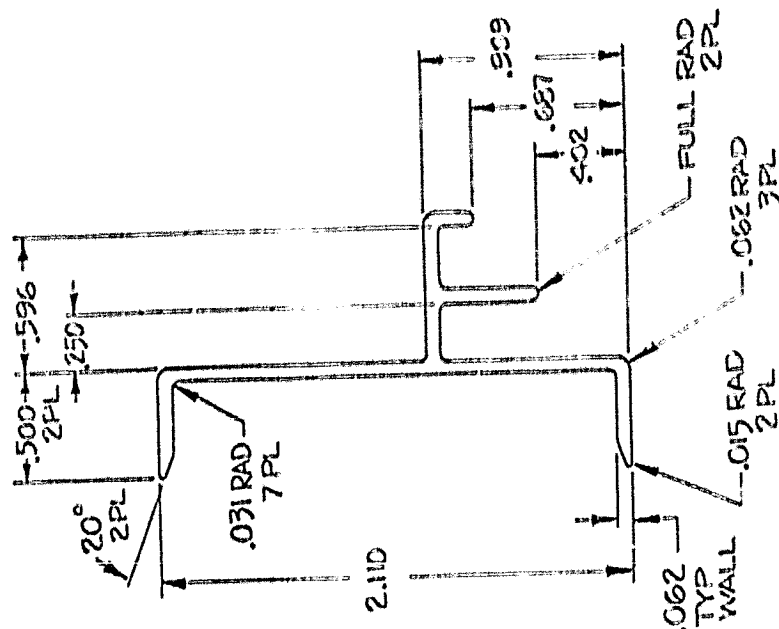


TABLE I

PART NO.	REMARKS
CP6 - 001	CUT INTO .50-.86 LENGTHS
CP6 - 002	LENGTH AS MILL SUPPLIED



# जमिंदार

100

**THE UNIVERSITY OF CHICAGO**

Rev. 10/1/79

## 1. MATERIAL:

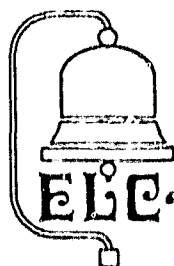
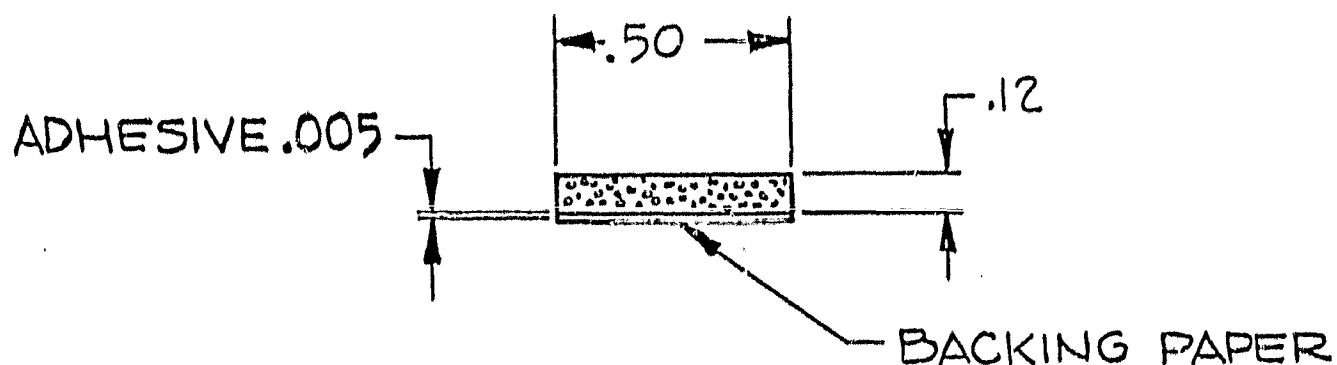
## CLOSED CELL SPONGE

DUROMETER 40-50

COLOR BLACK. PRESSURE-SENSITIVE

ADHESIVE BACKED WITH

PROTECTIVE BACKING PAPER.



9330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

# ELCAM, INC.

Contractors License No. 240399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	CP7	
.XX ± .00		1		PART NAME	
XXX ± .00		2		GASKET	
ANGULAR ±		3		DRAWN BY	
DRAFT		4		THOMSON	
		5		CHECKED	
				HJR	
				INCHES	
				SCALE NONE	
				DATE 14 NOV 76	
				APPROVED	
				MATERIAL	
				SEE NOTE 1	
				EXAMINER NO	
				ESP-C7	

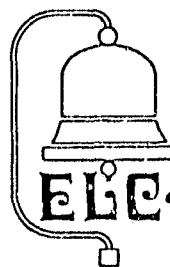
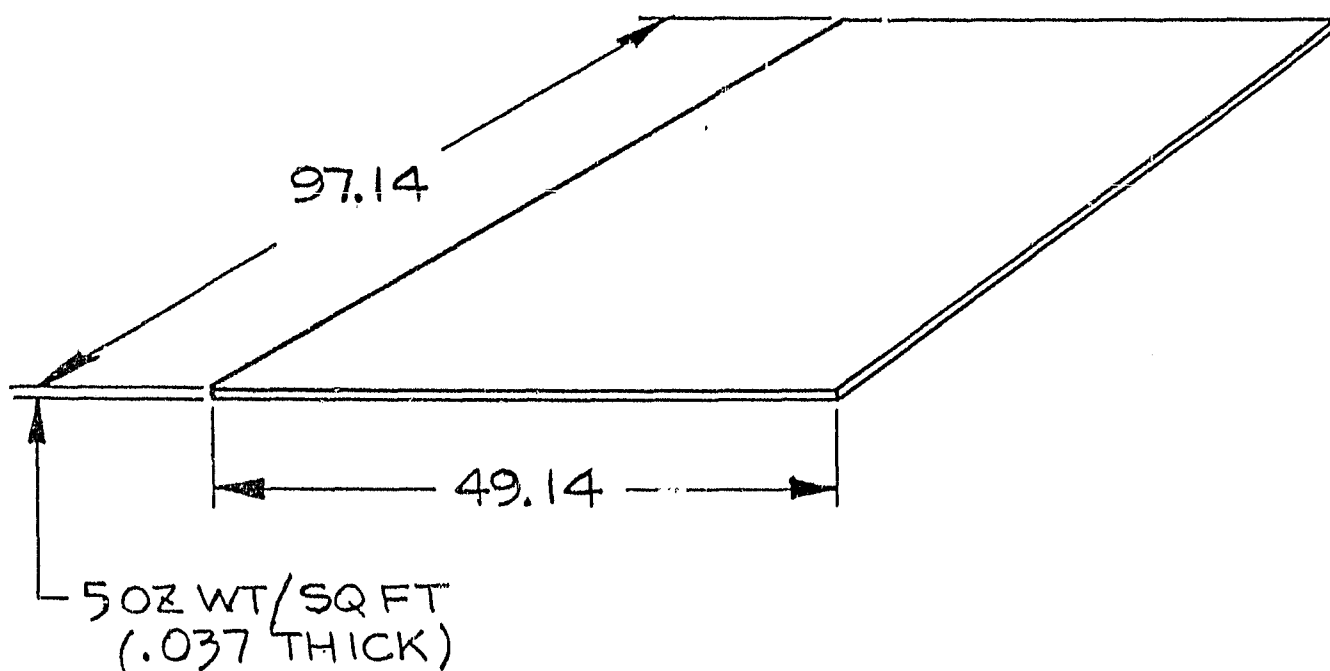
# NOTES:

## 1. MATERIAL:

ACRYLIC FORTIFIED POLYESTER  
RESIN REINFORCED WITH FIBERGLASS.  
PROTECTED WITH 1 MIL COATING OF  
DUPONT'S TEDLAR POLYVINYL FLUORIDE  
ONE SURFACE.  
COLOR - CRYSTAL CLEAR

## 2. VENDOR:

GLASTEEL INC.  
1727 BUENA VISTA  
DUARTE, CALIF. 91010



5330 DERRIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP8		
XX ± 0.0		1			PART NAME		
XXX ± 0.0		2			FIBERGLASS COVER		
ANGULAR ±		3			DESIGNED BY THOMSON		
DRAFT		4			CHECKED HUR		
		5			SCALE NONE		
					DATE 18 NOV 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO ESP-C8		

62-63  
JAN 2 1964  
CH 100



# NOTES:

## 1. MATERIAL:

RUBBER, SYNTHETIC  
COLOR BLACK, DURO 55

## 2. VENDOR(S)

RUBBERCRAFT CORP  
FSCM NO. 77969

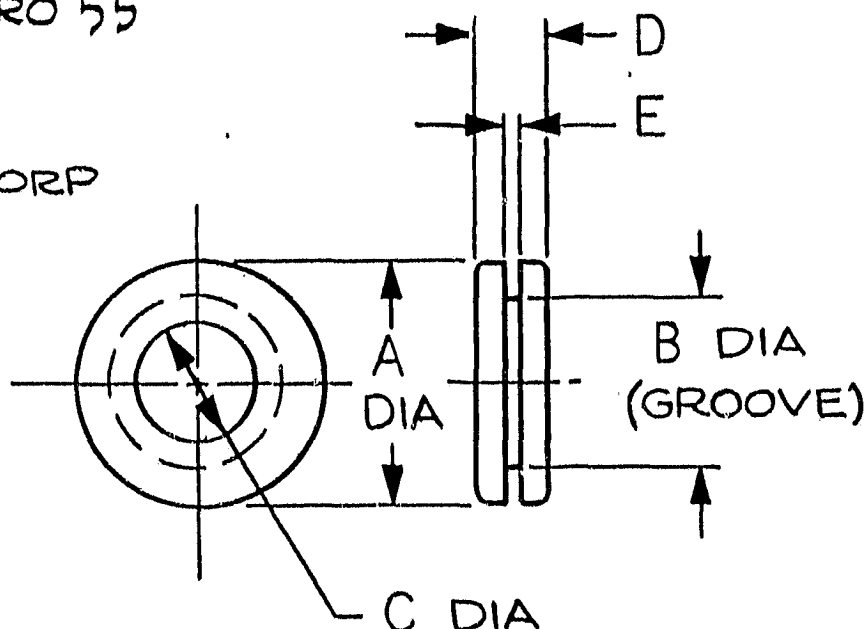
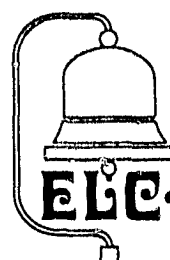


TABLE I

PART NO.	A	B	C	D	E	VENDOR PART NO.	
						RBR CRAFT	
CP10-001	1.12	.875	.625	.32	.062	NO.22	
CP10-002	.44	.312	.125	.22	.062	NO.59	



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP10	
.XX ± 0.0		1			PART NAME	
.XXX ± 0.0		2			RUBBER GROMMET	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			SCALE	
					NONE	
					DATE	
					4JR 14 NOV 76	
					MATERIAL	
					SEE NOTE 1	
					DRAWING NO	
					ESP-C10	

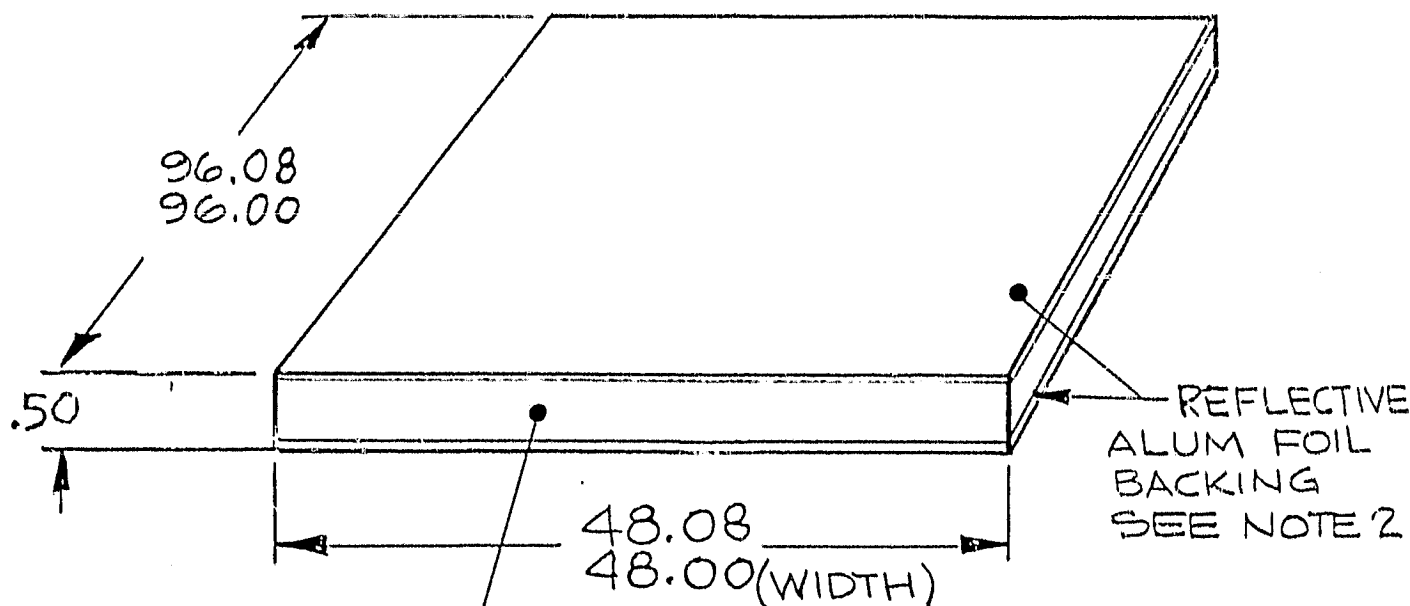
NOTES:

MATERIAL:

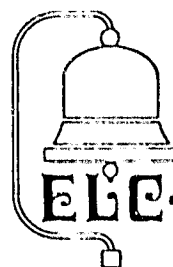
INSULATION BOARD, RIGID CELLULAR PLASTIC CORE,  
LAMINATED CONSTRUCTION WITH  
ALUM ALLOY FOIL BOTH SIDES (CELOTEX CORP)  
ALUM SHEET ON ONE SIDE BY ELCAM, INC.

2. VENDOR:

THE CELOTEX CORP.  
FSCM NO. 86105  
PART NO. TF-400



CLOSED  
CELL CELLULAR  
PLASTIC CORE  
SEE NOTE 2



9330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964-8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP11	
XX ± .002		1			PART NAME	
XXX ± .0004		2			REAR INSULATION	
ANGULAR ± -		3			THOMSON	
DRAFT		4			DATE 18 NOV 76	
		5			SCALE NONE	
					SEE NOTE 1	
					ESP-C11	

# NOTES:

## 1. MATERIAL:

INSULATION BOARD, RIGID CELLULAR PLASTIC CORE.  
SINGLE FACE CONSTRUCTION.  
ALUM FOIL BOTH SIDES.

## 2. VENDOR:

THE CELOTEX CORP.  
FSCM NO. 86105  
PART NO. TF-400

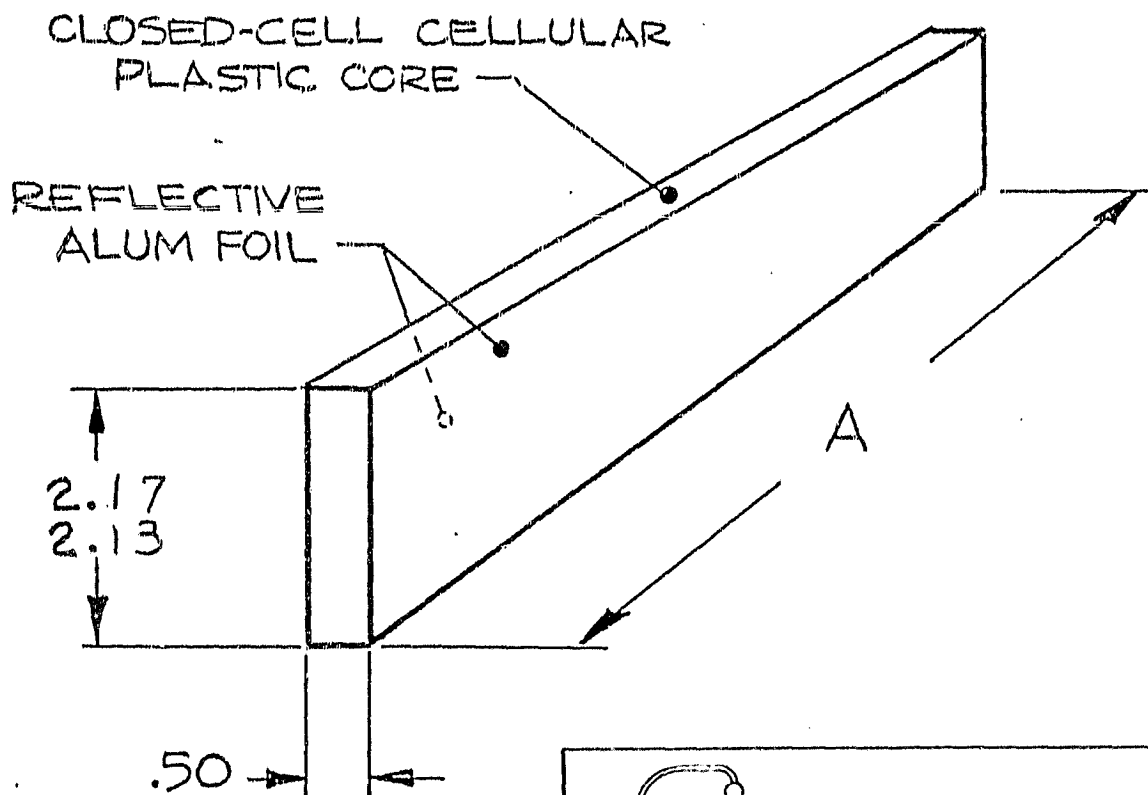


TABLE I

PART NO.	A
CPI2-001	96.60
CPI2-002	47.13



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CPI2	
.XX ± 0.0		1			SIDE INSULATION	
.XXX ± 0.0		2				
ANGULAR ±		3				
DRAFT		4				
		5				
					THOMSON	NOTE
					CHK'D HJR	DATE 18 NOV 76
					INACED	APP'D
					SEE NOTE 1	
					ESP-C12	

# NOTES:

## 1. MATERIAL:

ALUMINUM ALLOY BLIND  
RIVET, SEE VENDOR SPEC.

## 2. VENDOR:

USM CORP, "POP" RIVET DIV  
FSCM No. 07707

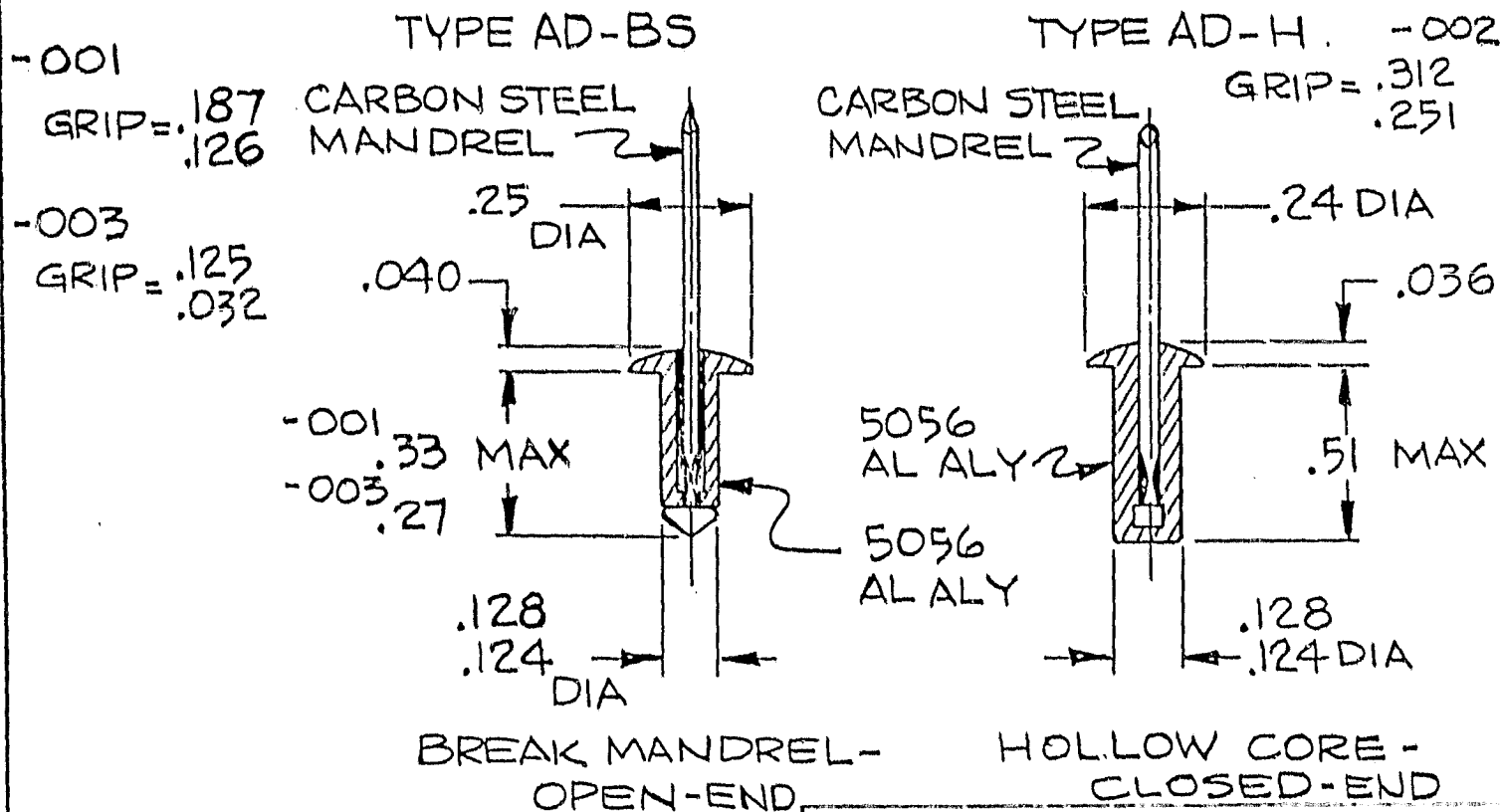
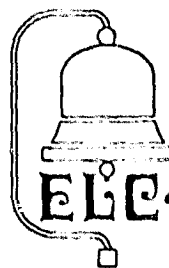


TABLE I

PART NO.	VENDOR PART NO.
CP13-001	AD43 BS
CP13-002	AD45 H.
CP13-003	AD42 BS



5330 DERRIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

**TOLERANCES**  
UNLESS OTHERWISE  
SPECIFIED DECIMAL  
XX ± .01  
XXX ± .00  
ANGULAR ±  
DRAFT  
VENDOR'S  
STD TOL  
APPLY

NO	DATE	BY
1		
2		
3		
4		
5		

PART NUMBER	CP13
PART NAME	POP RIVET
DRAWN BY	THOMSON
CHECKED	HJR
SCALE	NONE
DATE	14 NOV 76
APPROVED	
PATENT	SEE NOTE 1
DRAWING NO	ESP-C13

# NOTES:

## 1. MATERIAL:

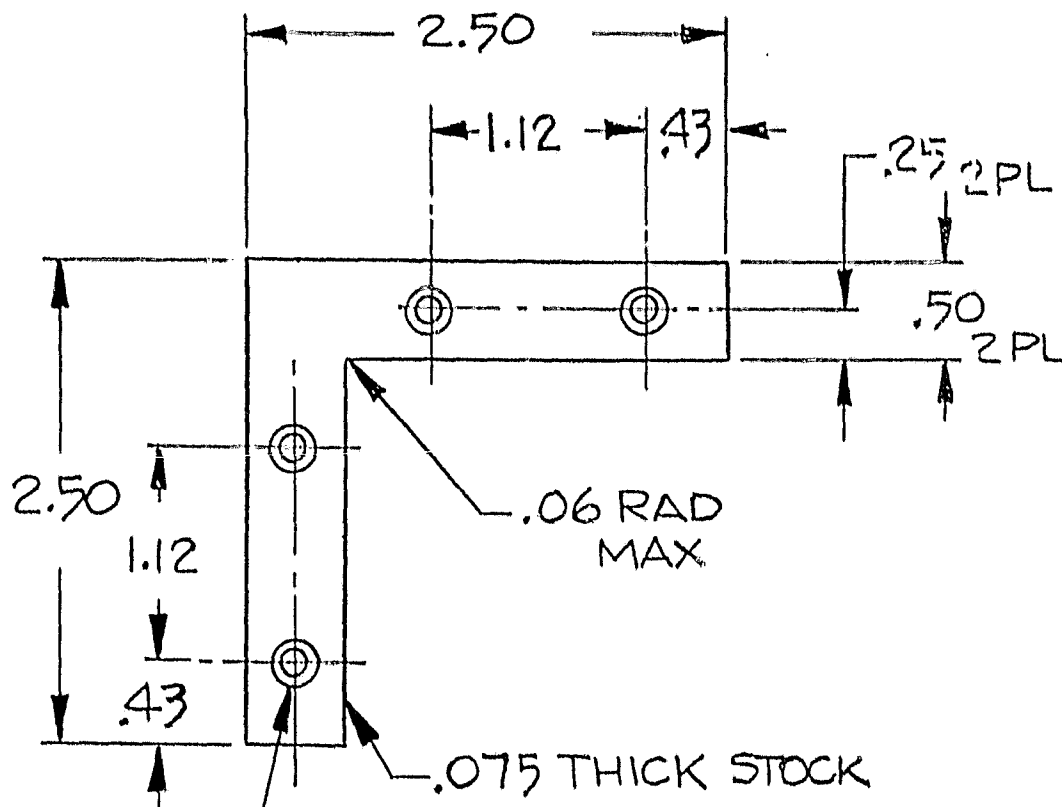
CARBON STEEL

## 2. PROTECTIVE FINISH:

ZINC PLATE

## 3. MFG PART NO.

STANLEY NO. 999



.198-.204 DIA  
CSK 120° TO .25 DIA  
4 HOLES



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No 290399

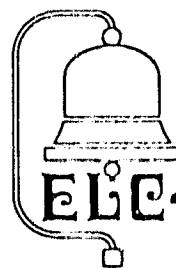
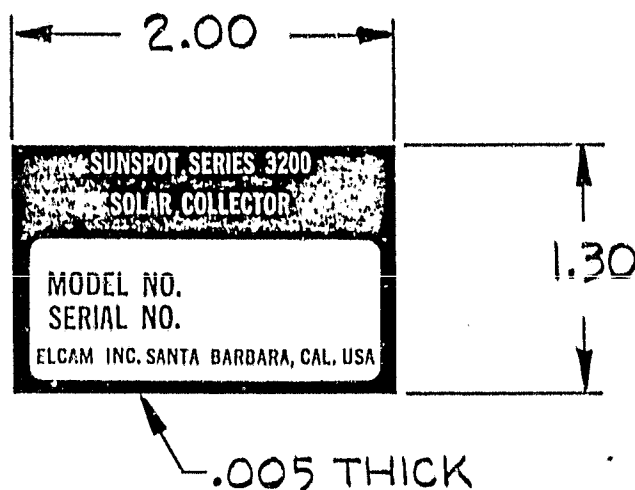
TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	
XX ± .00	2	1			
XXX ± .00	30	2			
ANGULAR ±		3			
DRAFT		4			
		5			
				CP 14	
				CORNER BRACKET	
				DRAWN BY THOMSON	
				DATE 14 NOV 76	
				SEE NOTE 1	
				ESP-C14	

NOTES:

1. MATERIAL:

PHOTOGRAPHIC PAPER.  
PRESSURE-SENSITIVE  
ADHESIVE BACKED WITH  
PROTECTIVE BACKING  
PAPER.

ORIGINAL PAGE IS  
OF POOR QUALITY



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	
XX ± .00		1			CP15
XXX ± .00		2			
ANGULAR ±		3			
DRAFT		4			
		5			
					PART NAME
					LABEL, COLLECTOR
					DRAWN BY
					THOMSON
					CHK'D
					11UR
					TRACED
					SCALE
					FULL
					DATE
					14 NOV 76
					APP'D
					SEE NOTE 1
					DRAWING NO
					ESP-C15

NOTES:

1. MATERIAL:

VINYL PLASTIC

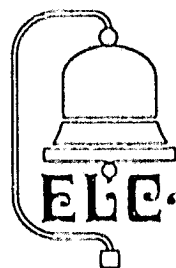
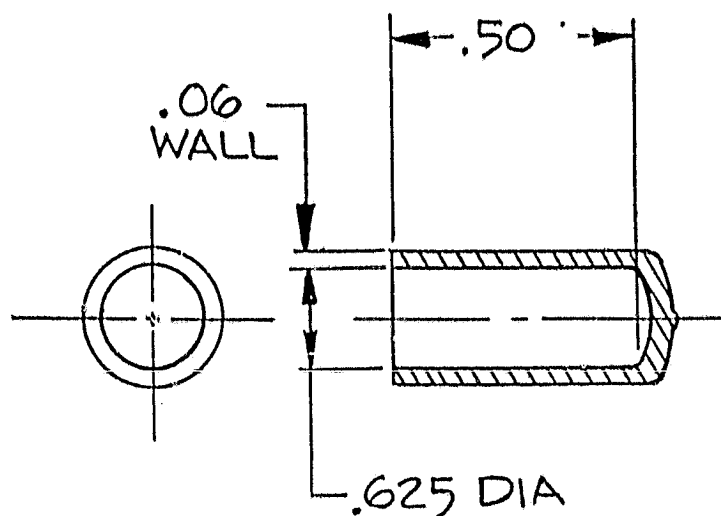
COLOR RED

2. VENDOR:

SINCLAIR & RUSH INC.

FSCM NO

PART NO. 625-8



9330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

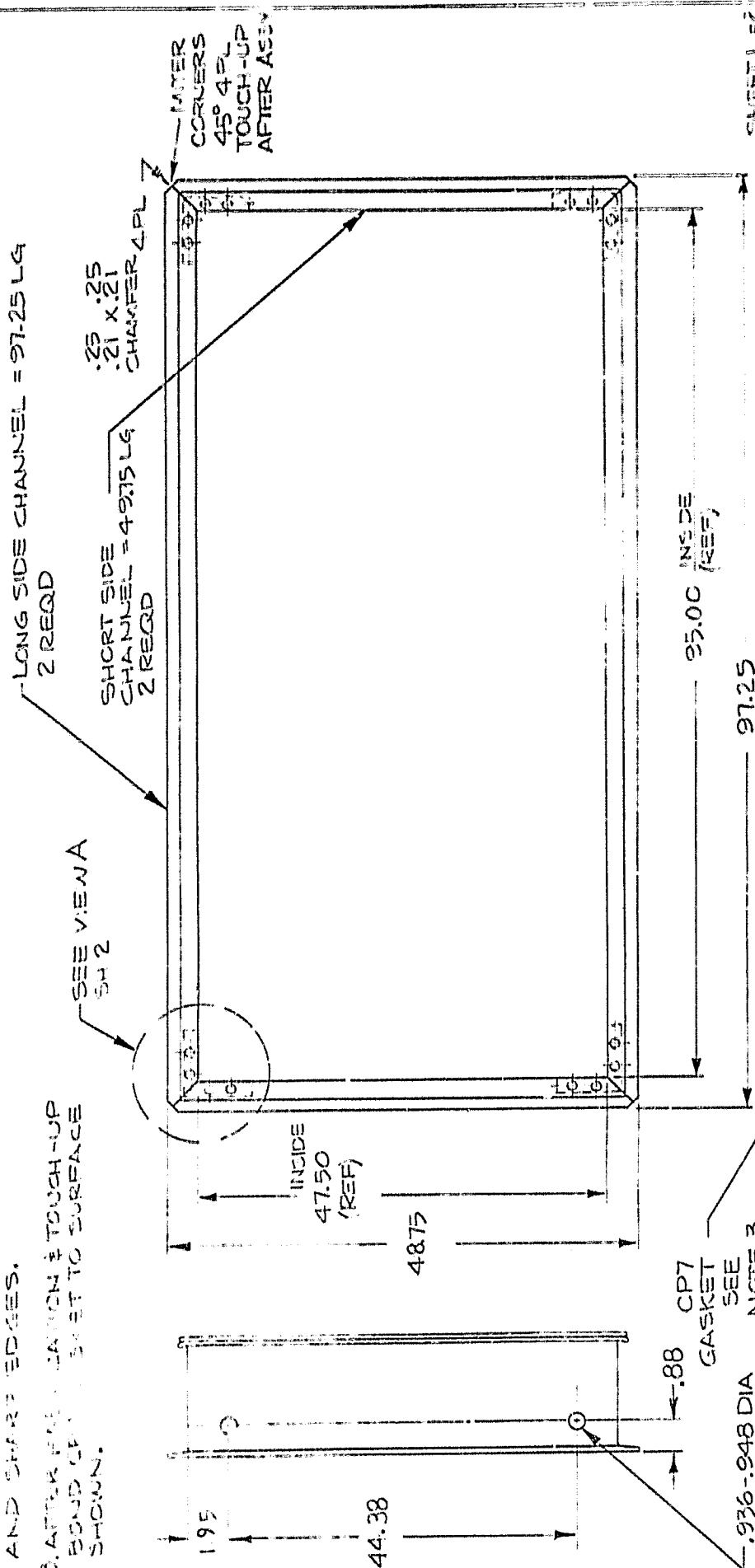
Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	CPI6	
.XX ± .00		1		PART NAME	
.XXX ± .00		2		VINYL CLOSURE	
ANGULAR ±		3		DRAWN BY	
DRAFT		4		THOMSON	
		5		SCALE NONE	
		6		DATE	
		7		SEE NOTE 1	
		8		DRAWING NO	
		9		ESP-C16	
		10		APPROVED	

CONVERTING TO SINGLES TOOLS  
AND THE CARRIERS. CONE RIGID HEADS  
NOTED IN THE CARRIERS SECTION 7-4.

U. S. GOVERNMENT PRINTING OFFICE  
AND SUNDRIES.

3. AFTER THE LAMINATION & TOUCH-UP  
BOULD CHECK THE EFFECT TO SURFACE  
FINISH.



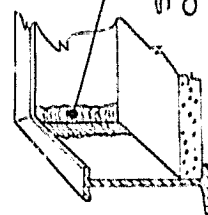
100

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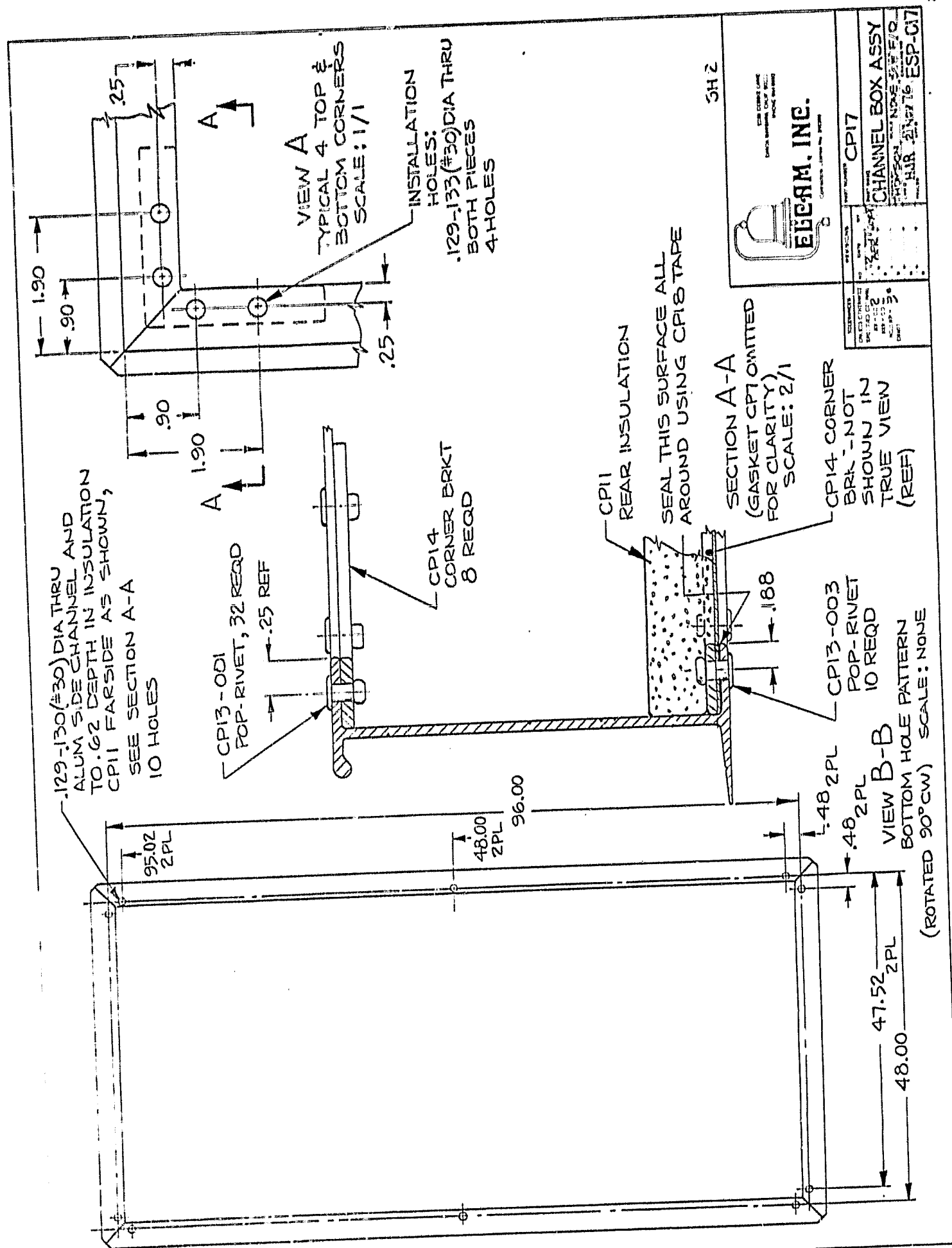
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T  
V  
III  
III  
XV  
H

CE-17

ALL 4  
CORNERS.  
SEAL INSIDE  
OF BOX AND  
WITH CRIS  
B A







NOTES:

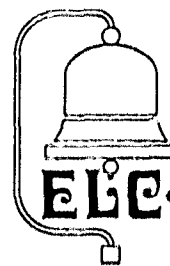
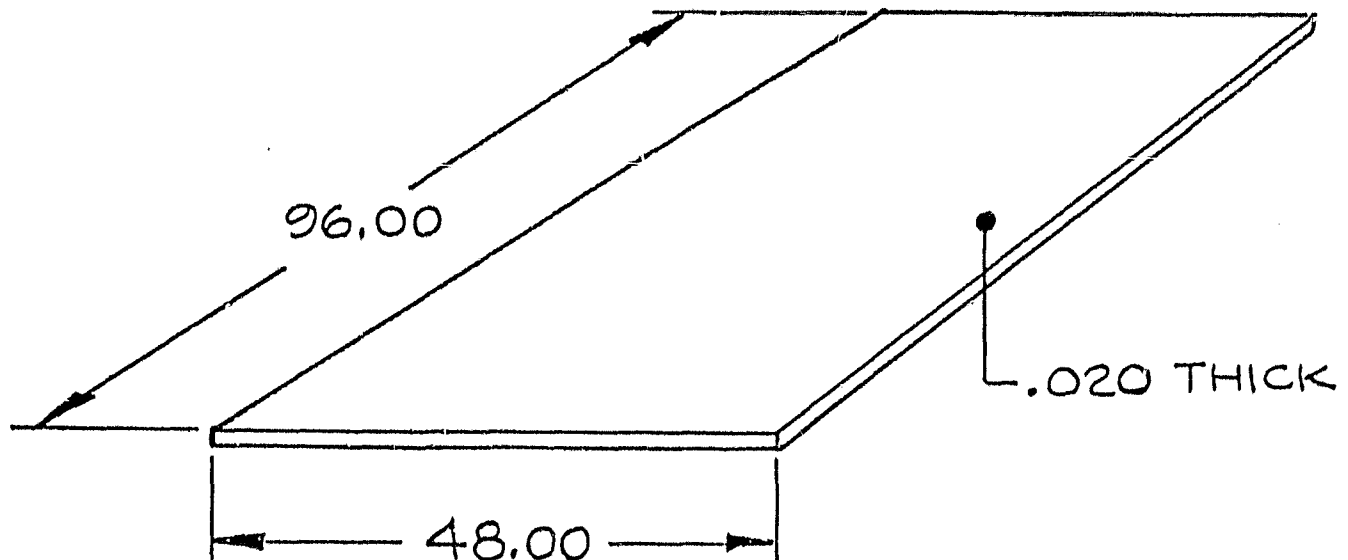
1. MATERIAL:

ALUMINUM ALLOY SHEET  
CMP SN 6061 TEMPER T6

2. VENDOR:

REYNOLDS METALS CO.  
FSCM NO. 09983

3. PROTECTIVE FINISH:  
NONE



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX ± .00 XXX ± .00 ANGULAR ±		<b>REVISIONS</b> <table border="1"> <tr> <th>NO</th> <th>DATE</th> <th>BY</th> </tr> <tr><td>1</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </table>		NO	DATE	BY	1			2			3			4			5			<b>PART NUMBER</b> CP 18	
NO	DATE	BY																					
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DRAFT VENDOR'S STD TOL APPLY		<b>PART NAME</b> BACKING SHEET		<b>DRAWN BY</b> THOMSON																			
		<b>SCALE</b> NONE		<b>MATERIAL</b> SEE NOTE 1																			
		<b>DATE</b> 12 APR 77		<b>DRAWING NO</b> ESP-C18																			
		<b>TRACED</b>		<b>APP'D</b>																			

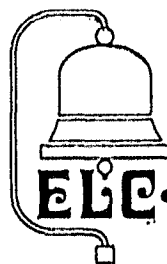
# NOTES:

## 1. MATERIAL:

ADHESIVE SEALANT  
SILASTIC RTV 732  
COLOR, CLEAR

## 2. VENDOR:

DOW-CORNING CORP  
FSCM NO. 71984



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8678

**ELCAM, INC.**

Contractors License No 290399

<b>TOLERANCES</b>		<b>REVISIONS</b>		<b>PART NUMBER</b>	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CPI9
XX ± 0.0 —		1			
XXX ± 0.0 —		2			
ANGULAR ±		3			
DRAFT		4			
		5			
		<b>PART NAME</b>			SEALANT
		DRAWN BY THOMPSON		SCALE NONE	MATERIAL NOTE 1
		CHK'D HJR		DATE 26 NOV 76	DRAWING NO
		TRACED		APP'D	ESP-C19

1. MATERIAL:

CLEAR FILM TAPE (5 MIL THICK)  
DOUBLE ADHESIVE COATED  
TAPE NO. 666  
"SCOTCH" BRAND  
3/4 WIDE X 36 YARD ROLL

2. VENDOR:

MINN MINING & MFG CO.  
FSCM NO. 26066



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
864 8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO.	DATE	BY	CP20	
XX ± 00 -		1			PART NAME	
XXX ± 00 -		2			SEALING TAPE	
ANGULAR ± -		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			CHK'D HJR	
					DATE 23 NOV 76	
					SCALE NONE	
					SEE NOTE 1	
					DRAWING NO	
					ESP-C20	

1. MATERIAL:

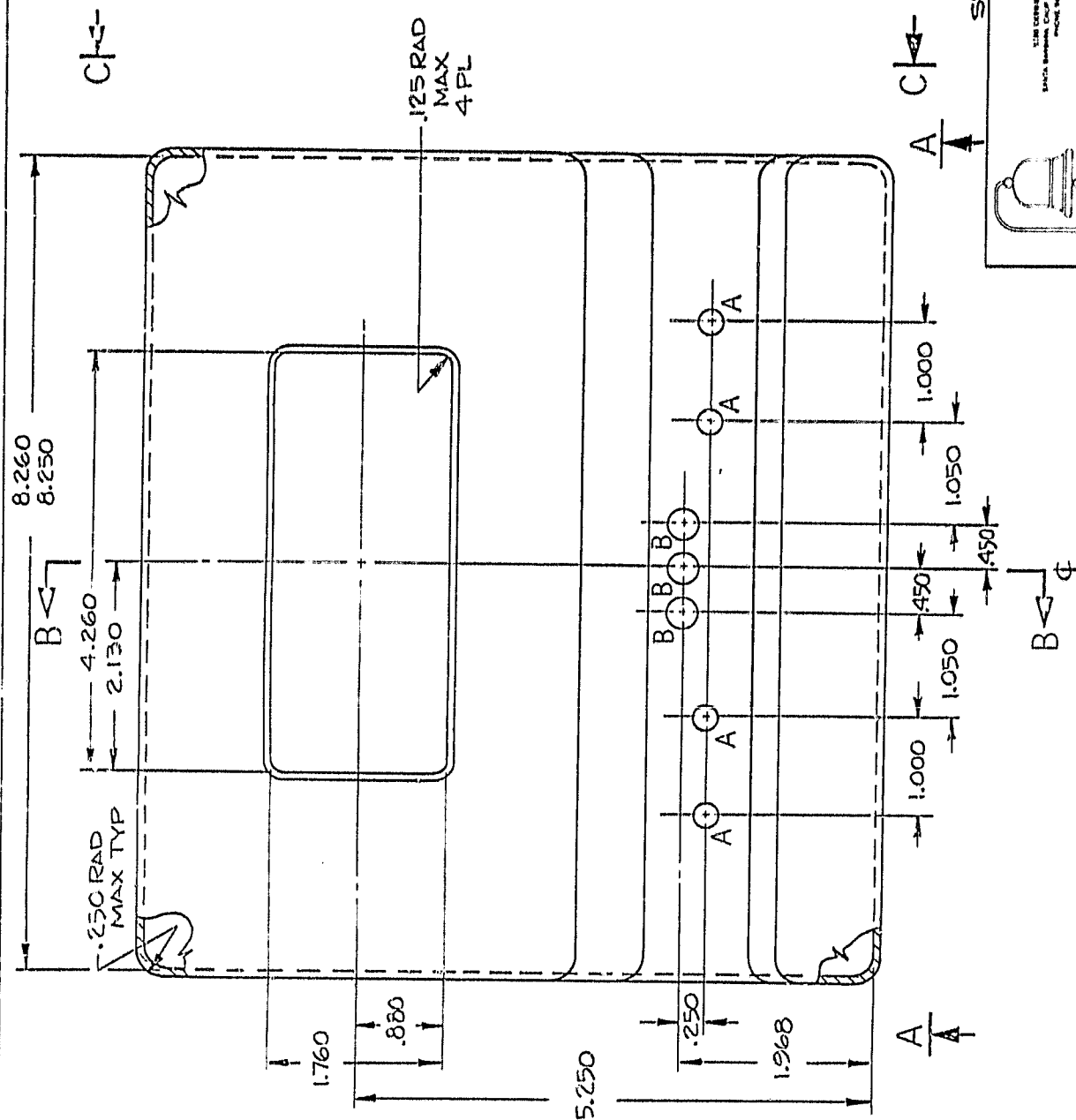
PERSONS OF THE NAME  
OF GOODWIN  
RETURNED ARE

2. PART SHALL BE FREE OF CUTS, TEARS, OR FLASH EXCEEDING .01.

ORIGINAL PAGE IS  
OF POOR QUALITY

TABLE I

LTR	SIZE	QTY
A	.250-.257 DIA	4
B	.310-.317 DIA	3



2415 SHILS

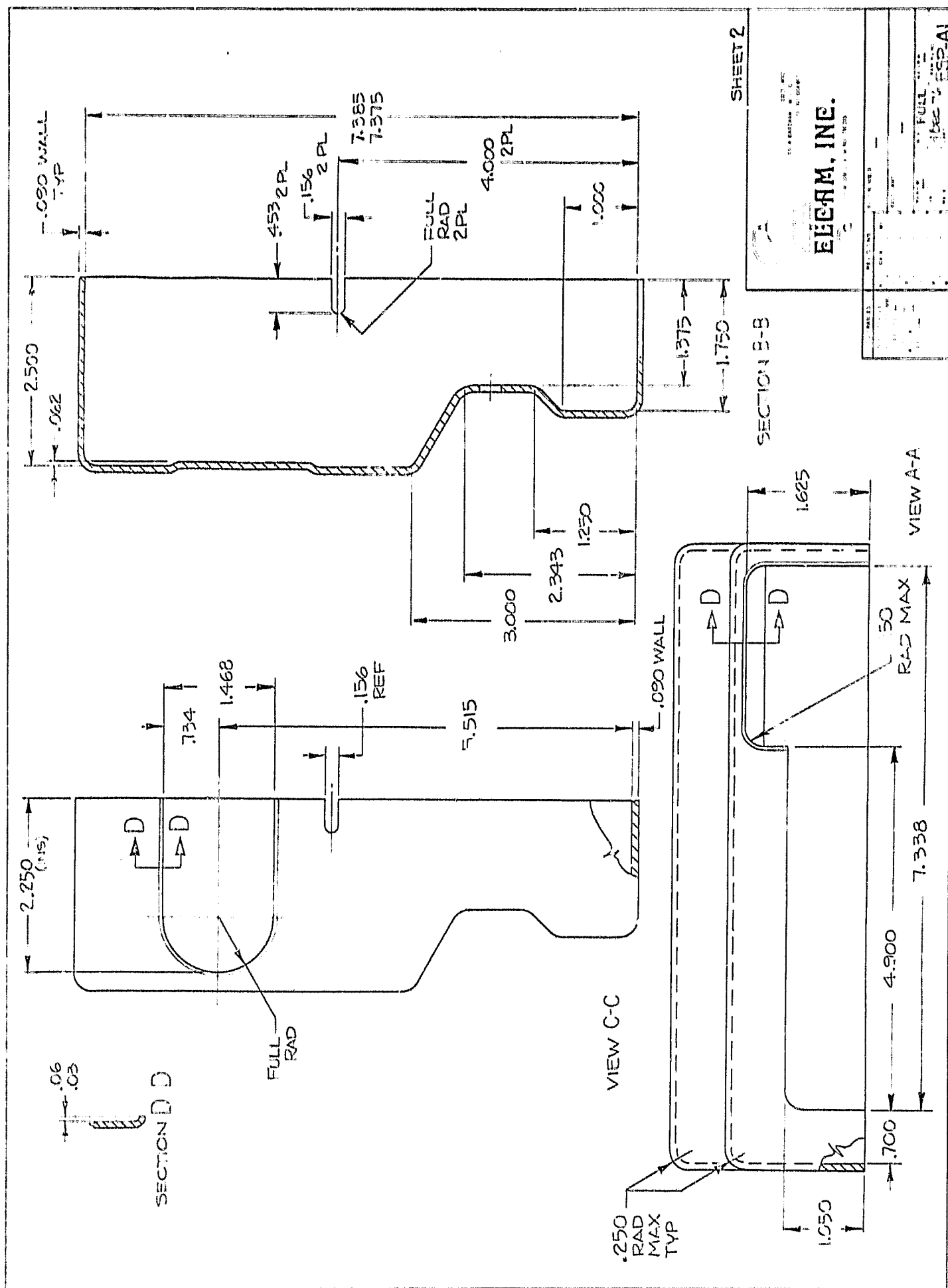


KING DAVID LANE  
 1401A BROADWAY DRIVE WYOMING  
 82001-3404

# WELLS FARGO

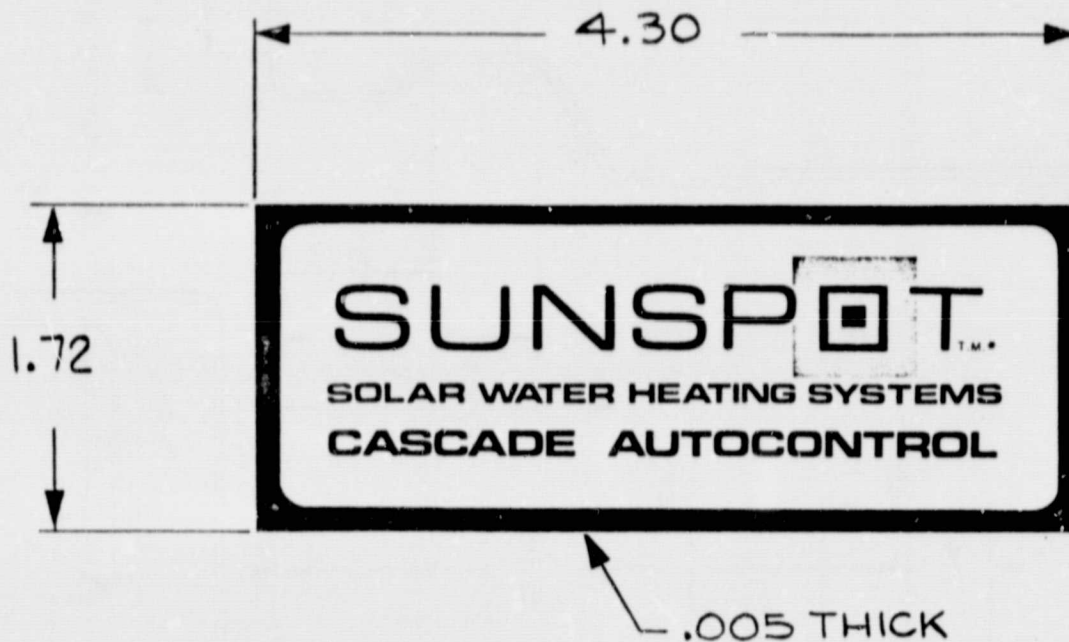
1. **THE COMPANY**  
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 98. **THE COMPANY**  
 99. **THE COMPANY**  
 100. **THE COMPANY**

[illegible]



NOTES:

1. MATERIAL:  
 PHOTOGRAPHIC PAPER  
 PRESSURE SENSITIVE ADHESIVE  
 BACKED WITH PROTECTIVE BACKING  
 PAPER.



5330 DEBBIE LANE  
 SANTA BARBARA, CALIF. 93111  
 PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 2		
XX ± .00		1			PART NAME LABEL, AUTOCONTROL		
XXX ± .00		2					
ANGULAR ±		3			DRAWN BY THOMSON	SCALE FULL	MATERIAL SEE NOTE 1
DRAFT		4			CHK D	DATE 5 DEC 76	DRAWING NO
		5			TRACED	APP D	ESP- A2

NOTES:

1. MATERIAL:  
STEEL, CARBON  
C10PSN1010 TEMP 4  
NO. 16 GA. (.048)

2. PROTECTIVE FINISH:  
ZINC PLATE  
.0002 MIN THICKNESS  
CLEAR CHROMATE  
SPEC QQ-Z-325

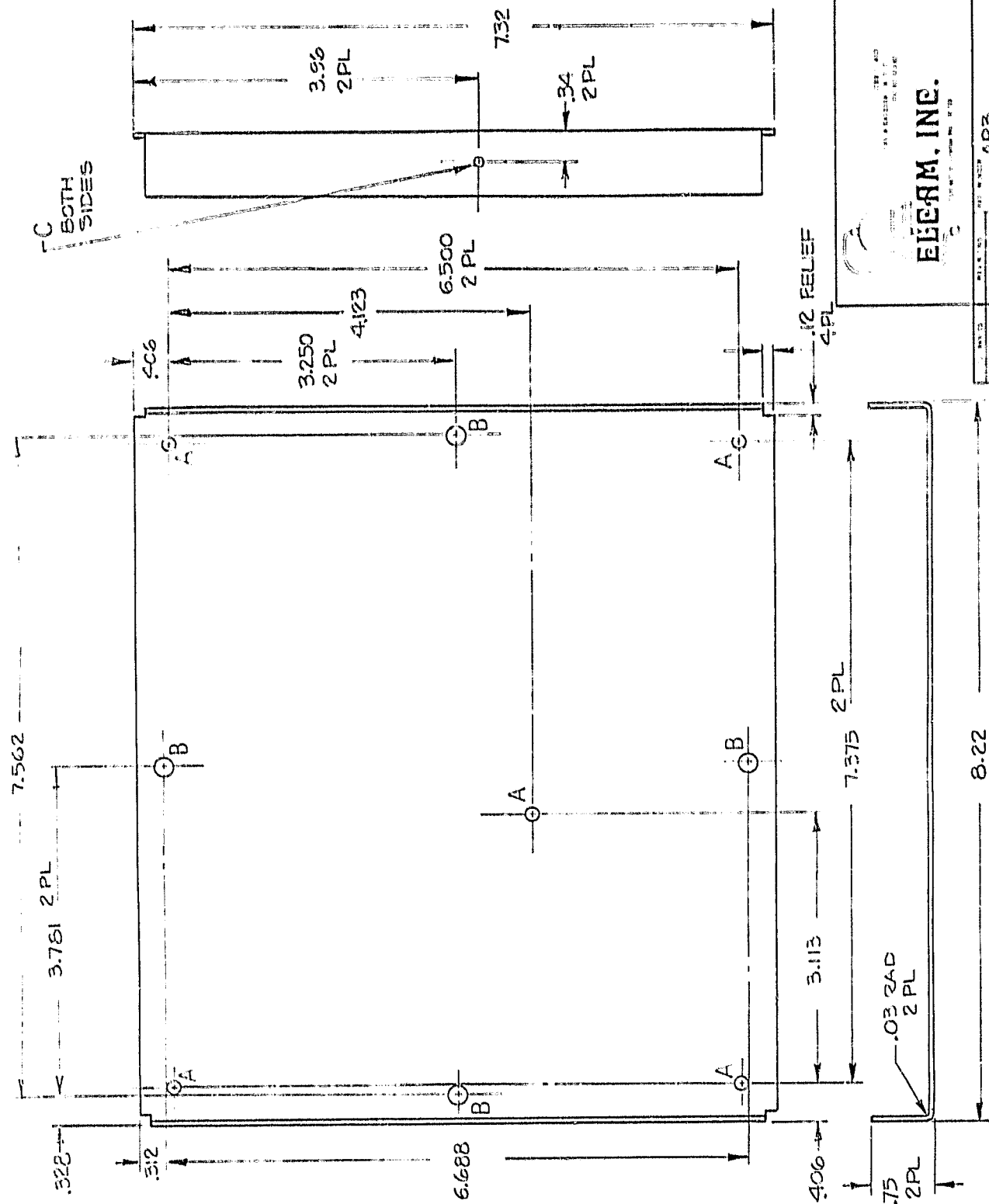


TABLE I

LTR	SIZE	QTY
A	.156 - .162	4
B	.203 - .209	5
C	.106 - .113	2

THE  
ELECTRAM  
CORPORATION  
NEW YORK, N. Y.

ELECTRAM, INC.

AP3

BASE PLATE

CONSTRUCTION  
ELECTRAM, INC.



# NOTES:

## 1. MATERIAL:

ALUM ALLOY

CMPSN 2011, TEMPER T3

## 2. PROTECTIVE FINISH:

CLEAR CHROMATE

## 3. PART NO. 2106-632-A-0 (RAF)

PART NO. 350-7417-08-19 (CAMBION)

## 4. SUGGESTED SOURCE(S) OF SUPPLY:

RAF ELECTRONIC HARDWARE INC

260 HATHAWAY

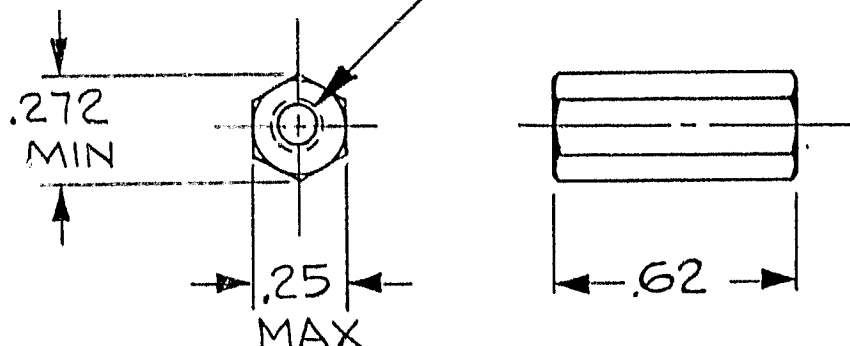
STRATFORD, CONN. 06497

CAMBRIDGE THERMIONIC

CORP (CAMBION)

FSCM 71279

.138-32 UNC-2B  
THRU ENTIRE LENGTH



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES	REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	AP4		
XX ± 00 2	1			PART NAME		
.XXX ± 00 -	2			STANDOFF		
ANGULAR ±	3			DRAWN BY	SCALE	MATERIAL
DRAFT	4			THOMSON	2/1	SEE NOTE 1
	5			CHK D	DATE	DRAWING NO
					5 DEC 76	ESP-A4
				TRACED	APP D	

**NOTES:**

**1. MATERIAL:**

ALUMINUM ALLOY  
CMP5N 6063 TEMPER T5

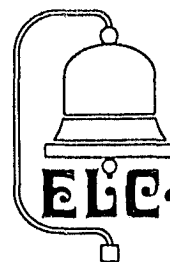
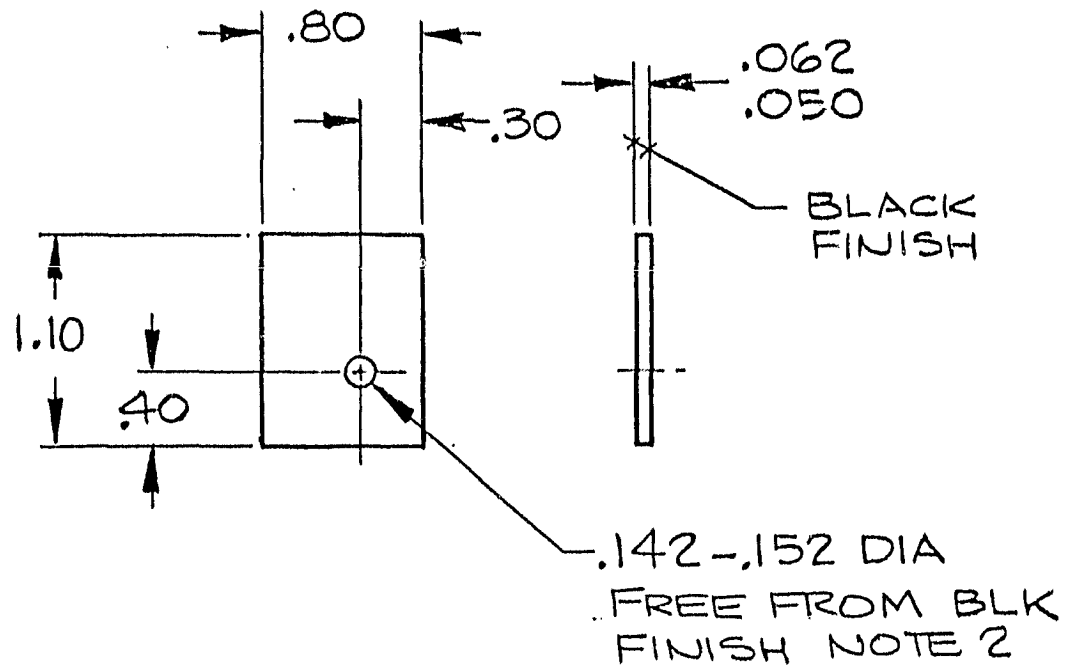
**2. PROTECTIVE FINISH:**

CHEM FILM (ALODINE)

FINISH COAT WITH MARTIN

NO. 23 (LUSTER-LESS BLACK)

ON INDICATED SURFACES.



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
854-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP5		
.XX ± 0.0		1			PART NAME		
.XXX ± 0.0		2			HEAT SINK		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	FULL	SEE NOTE 1
		5			CHR D	DATE	DRAWING NO
					TRAC'D	7 DEC 76	ESP-A5
						APP'D	

NOTES:

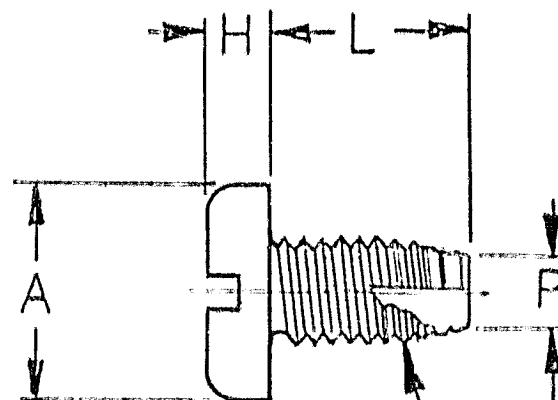
I. MATERIAL:

TAPPING SCREW,

SLOTTED PAN HEAD,

STEEL, CARBON

AISI 1016 to 1024



.138-32  
USA STD TYPE T  
(TYPE 23)

TABLE I

PART NO.	A	H	L	P
AP6 -001	.256-.270	.072-.082	.22 - .25	.095-.106
AP6 -002	.256-.270	.072-.082	.35 - .38	.095-.106

TABLE II

DESIGN RECOMMENDATION

THICKNESS	HOLE SIZES FOR	
	STEEL	ALUM
.060	.113 (#33)	.109 (7/64)
.083	.116 (#32)	.111 (#34)



5310 DEBORH LANE  
SANTA BARBARA, CALIF 93111  
064-8676

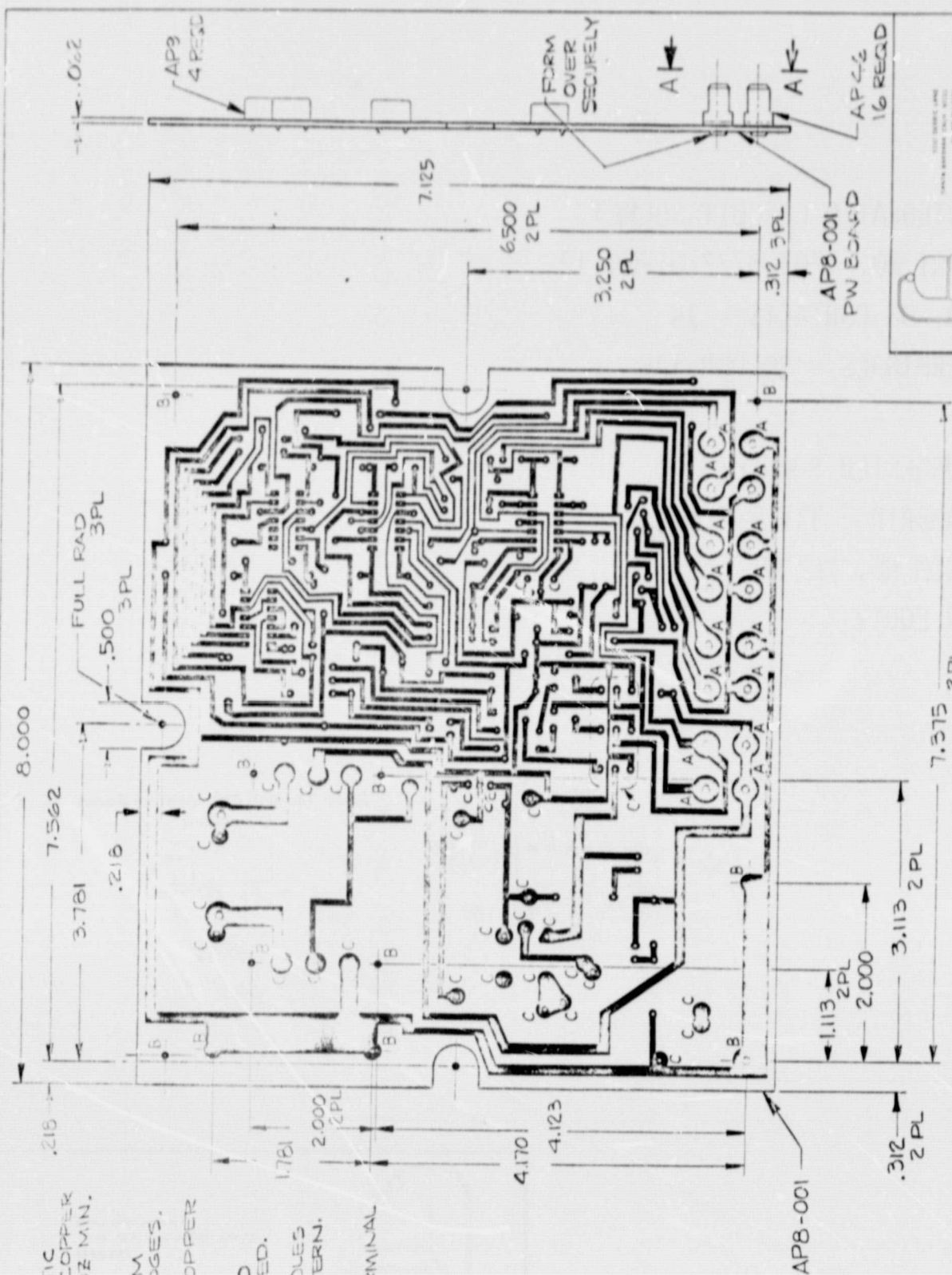
**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	AP 6	
XX ± .00		1		PART NAME	
XXX ± .00		2		SCREW, SELF TAPPING	
ANGULAR ±		3		DRAWN BY THOMSON	
DRAFT		4		SCALE NONE	
60		5		DATE 4 DEC 76	
		TRACED		MATERIAL SEE NOTE 1	
				DRAWING NO ESP- A6	

# NOTES:

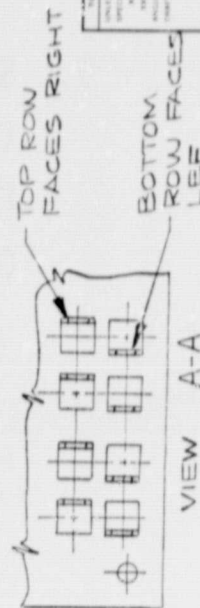
1. MATERIAL:  
EPOXY RESIN PLASTIC  
LAM GLASS BASE; COPPER  
CLAD ONE SIDE, 1 OZ MIN.
2. MUST BE FREE FROM  
BURRS & SHARP EDGES.
3. DO NOT DEBURR COPPER  
FILM.
4. SOLDER COAT 60/40  
.0005 MIN AND FUSED.
5. LOCATED UNDIM HOLES  
FROM ETCHED PATTERN.
6. HOLES SHALL NOT  
BREAK OUT OF TERMINAL  
CIRCUIT PATH.



ORIGINAL PAGE IS  
OF POOR QUALITY

TABLE I

LTR	HOLE SIZE	QTY
A	.150-.157	16
B	.156-.162	11
C	.056-.062	41
UNMARKED	.034-.038	TYP



PRINTED WIRE BOARD ASSY  
ELEM. INC.  
115E-A8

# NOTES:

## 1. INTEGRATED CIRCUIT SOCKET

PART NO. =703-3777-01-04-12

NO. OF CONTACTS = 14

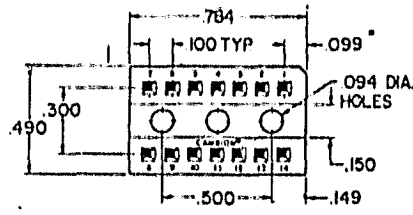
TERMINALS = SOLDER TAB

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

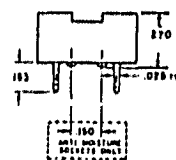
CAMBRIDGE THERMIONIC CORP (CAMBION)

FSCM NO. 71279

OR EQUIV



Solder Tab with Anti-Moisture Bosses  
Dimensions



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

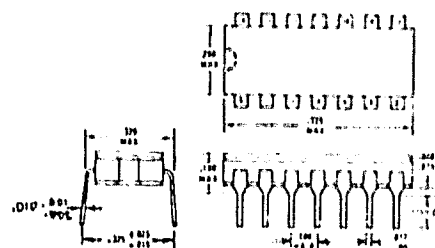
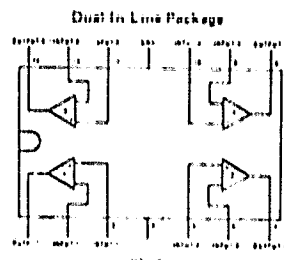
**ELCAM, INC.**

Contractors License No 290399

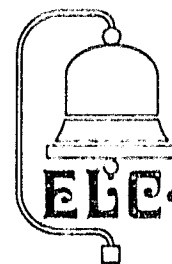
TOLERANCES	REVISIONS			PART NUMBER		
	NO	DATE	BY	AP 9		
UNLESS OTHERWISE SPECIFIED DECIMAL .XX ± 0.0 — .XXX ± 0.0 — ANGULAR ± DRAFT	1			PART NAME		
	2			I.C. SOCKET		
	3			DRAWN BY	SCALE	MATERIAL
	4			THOMSON	NONE	SEE NOTE 1
	5			CHK D	DATE	DRAWING NO
				TRACED	DEC 76	ESP-A9
					APP D	

# NOTES:

1. INTEGRATED CIRCUIT  
PART NO. LM324N  
OPERATIONAL AMPLIFIER
2. SUGGESTED SOURCE(S) OF SUPPLY:  
NATIONAL SEM-COND CORP  
FSCM NO.27014  
OR EQUIV



14 LEAD CAVITY DIP



5330 DEBBIE LANE  
SANTA BARBARA CALIF 93111  
864-8676

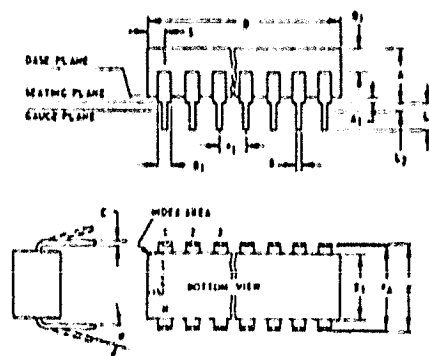
**ELCAM, INC.**

Contractors License No. 290599

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 10	
XX ± 00 —		1			PART NAME	
XXX ± 00 —		2			I.C. LM324N OPER-AMPL	
ANGULAR ±		3			DRAWN BY	SCALE
DRAFT		4			THOMSON	NONE
		5			CHK'D	DATE
					TRACED	1 DEC 76
						APP'D
						MATERIAL
						SEE NOTE 1
						DRAWING NO
						ESP-A10

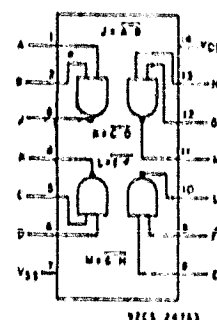
# NOTES:

1. DIGITAL INTEGRATED CIRCUIT  
PART NO. CD4011 A/E., QUAD 2 INPUT
2. SUGGESTED SOURCE(S) OF SUPPLY:  
R.C.A. CORP SOLID STATE DIV  
FSCM NO. 18714  
OR EQUIV



(E), Suffixes  
JEDEC MO-001-AB  
14-Lead

SYMBOL	INCHES		NOTE
	MIN	MAX	
A	0.155	0.200	
A1	0.020	0.050	
B	0.014	0.020	
B1	0.060	0.065	
C	0.008	0.012	1
D	0.745	0.770	
E	0.300	0.325	
E1	0.240	0.260	
*1	0.100 TP		2
*A	0.300 TP		2, 3
L	0.125	0.150	
L2	0.000	0.030	
a	0°	15°	4
N	14		5
N1	0		6
G1	0.040	0.075	
S	0.065	0.090	



CD4011AE

PLASTIC PACKAGE  
(E SUFFIX)

- NOTES:  
Refer to Rules for Dimensioning (JEDEC Publication No. 13)  
for Axial Lead Product Outlines
1. When this device is supplied solder dipped, the maximum lead thickness (narrow portion) will not exceed 0.013" (0.33 mm).
  2. Leads within 0.005" (0.12 mm) radius of True Position (TP) at gauge plane with maximum material condition and unit installed.
  3. \*A applies in zone L2 when unit installed.
  4. \*a applies to spread leads prior to installation.
  5. N is the maximum quantity of lead positions.
  6. N1 is the quantity of allowable missing leads.



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TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 11	
XX ± 00 —		1			PART NAME	
XXX ± 00 —		2			IC-CD4011 LOGIC CHIP	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			SCALE	
		6			NONE	
		7			DATE	
		8			DEC 76	
		9			MATERIAL	
		10			SEE NOTE 1	
		11			DRAWING NO	
		12			ESP-A11	

# NOTES:

## 1. TRANSISTOR

PART NO. 2N4401

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

FAIRCHILD SEMI-COND

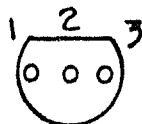
FSCM 07263

OR EQUIV

TABLE I

MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

RATING	SYMBOL	VALUE	UNIT
COLLECTOR - EMITTER VOLTAGE	$V_{CE0}$	40	VDC
COLLECTOR BASE VOLTAGE	$V_{CB}$	60	VDC
EMITTER BASE VOLTAGE	$V_{EB}$	60	VDC
COLLECTOR CURRENT-CONTINUOUS	$I_C$	600	MA DC
TOTAL DEVICE DISSIPATION $T_A = 25^\circ\text{C}$ DERATE ABOVE $25^\circ\text{C}$	$P_D$	310 2.81	MW MW/ $^\circ\text{C}$
OPERATING & STORAGE JUNCTION TEMPERATURE RANGE	$T_J$ TSTG	$-55$ TO $+135$	$^\circ\text{C}$

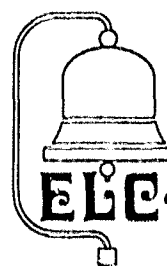


STYLE 1

PIN 1 EMITTER

PIN 2 BASE

PIN 3 COLLECTOR



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964-8678

**ELECTRAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 12
XX ± 00 —		1			PART NAME <b>TRANSISTOR 2N4401</b>
XXX ± 00 —		2			
ANGULAR ±		3			
DRAFT		4			
		5			
		DRAWN BY <b>THOMSON</b>		SCALE <b>NONE</b>	MATERIAL <b>SEE NOTE 1</b>
		CHK D		DATE <b>DEC 76</b>	DRAWING NO <b>ESP-A12</b>
		TRACED		APP D	



# NOTES:

1. TRANSISTOR

PART NO. 2N4403

2. SUGGESTED SOURCE(S) OF SUPPLY:

FAIRCHILD SEMI-COND

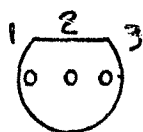
FSCM 07263

OR EQUIV

TABLE I

MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED)

RATING	SYMBOL	VALUE	UNIT
COLLECTOR - EMITTER VOLTAGE	$V_{CE0}$	40	V <sub>DC</sub>
COLLECTOR - BASE VOLTAGE	$V_{CB}$	40	V <sub>DC</sub>
EMITTER - BASE VOLTAGE	$V_{EB}$	5.0	V <sub>DC</sub>
COLLECTOR CURRENT - CONTINUOUS	$I_c$	600	mA <sub>DC</sub>
TOTAL DEVICE DISSIPATION $T_A=25^\circ\text{C}$ DERATE ABOVE $25^\circ\text{C}$	$P_D$	310 2.81	MW MW/ $^\circ\text{C}$
OPERATING & STORAGE JUNCTION TEMPERATURE RANGE	$T_J, T_{STG}$	$-55$ TO $+135$	$^\circ\text{C}$



STYLE 1

PIN 1 EMITTER

PIN 2 BASE

PIN 3 COLLECTOR



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SANTA BARBARA, CALIF. 93111  
964-8670

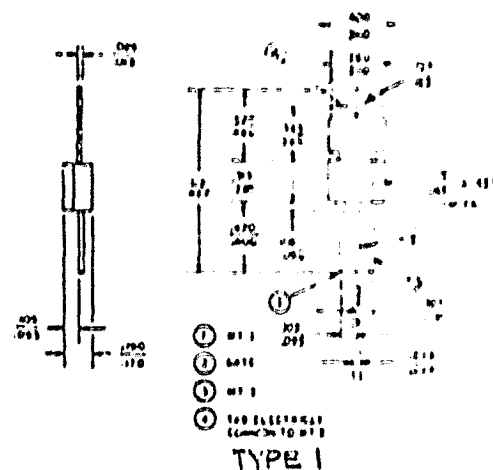
**ELCAM, INC.**

Contractors License No. 790399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX ± 00 XXX ± 00 ANGULAR ± DRAFT	<b>REVISIONS</b>			<b>PART NUMBER</b>		
	NO	DATE	BY	AP 13		
	1			PART NAME		
	2			TRANSISTOR 2N4403		
	3			DRAWN BY		
	4			THOMSON	SCALE	NONE
	5			CHK'D	DATE	2 DEC 76
				TRACED	APP'D	ESP -A13

# NOTES:

1. TRIAC (THYRISTOR)  
PART NO. GENERAL ELECTRIC SC137-A  
OR  
PART NO. MOTOROLA 2N6070A
2. SUGGESTED SOURCE(S) OF SUPPLY:  
MOTOROLA INC SEMI-COND PRODUCTS DIV  
FSCM NO. 04713  
  
GENERAL ELECTRIC CO, SEMI-CONDUCTOR  
FSCM NO. 09214

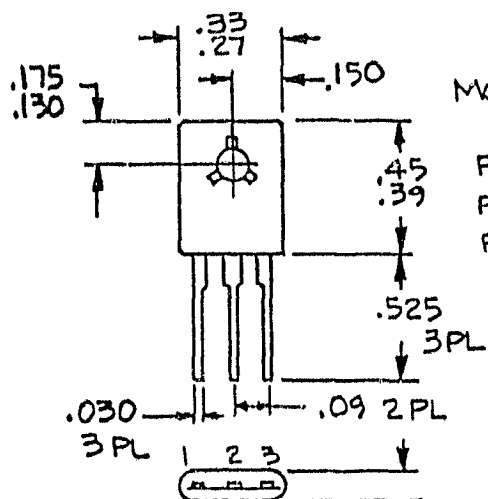


## TABLE I

PART NO.	VENDOR PART NO.	
	MOTOROLA	GENERAL ELECTRIC
AP 14	2N6070A	SC137A

## TABLE II ELECTRICAL SPECIFICATIONS

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
PEAK ON-STATE SURGE CURRENT ONE FULL CYCLE (NON REP)	ITSM	—	—	30	AMPS
REPETITIVE OFF-STATE VOLTAGE	VDRM	—	—	100	VOLTS
RMS ON-STATE CURRENT 360° CONDUCTION	IT (RMS)	—	—	3	AMPS
PEAK GATE TRIGGER CURRENT	QUADRANT	I	II	III	IV
MAXIMUM VALUE (MA)	ICTM @TJ 25°C	10	10	10	10



MOTOROLA  
STYLE 5  
PIN 1 MT1  
PIN 2 MT2  
PIN 3 GATE

HEAT-SINK  
CONTACT AREA  
(BOTTOM)

CASE 77-02



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964-6676

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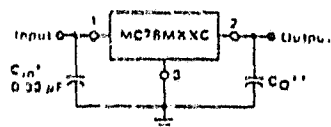
Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	AP 14	
XX ± .00 —	1			PART NAME	
XXX ± .00 —	2			TRIAC (THYRISTOR)	
ANGULAR ±	3			DRAWN BY	
DRAFT	4			THOMSON	
	5			SCALE NONE	
				DATE 2 DEC 76	
				TRACED	
				MATERIAL NOTE 1	
				ESP-A14	

# NOTES:

- VOLTAGE REGULATOR  
PART NO. FUA 7812UC
- SUGGESTED SOURCE(S) OF SUPPLY:  
FAIRCHILD SEMI-COND  
FSCM 07263  
OR EQUIV.

## STANDARD APPLICATION

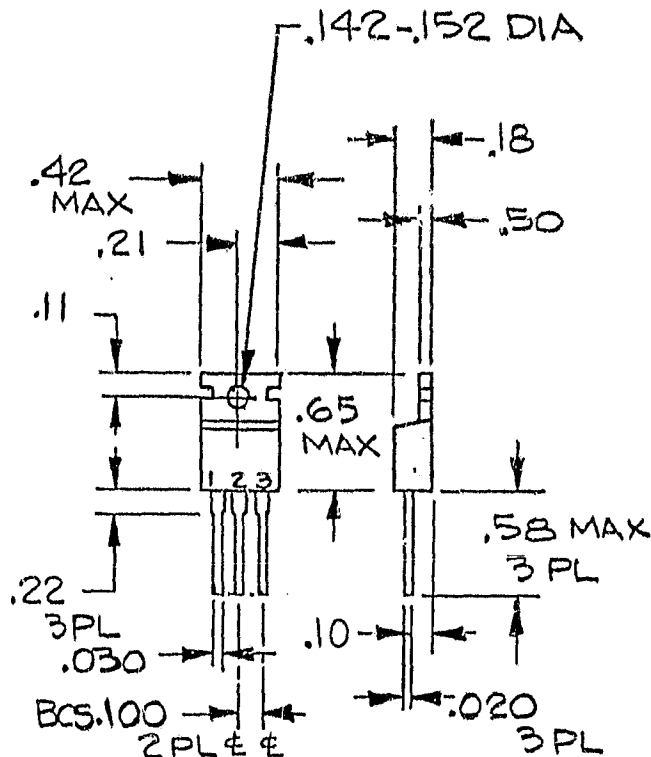


A common ground is required between the input and the output voltages. The input voltage must remain typically 2.0 V above the output voltage even during the low point on the input ripple voltage.

XX = these two digits of the type number indicate voltage.

\* C<sub>in</sub> is required if regulator is located an appreciable distance from power supply filter.

\*\* C<sub>O</sub> improves stability and transient response.



HEAT SINK SURFACE CONNECTED TO PIN 3



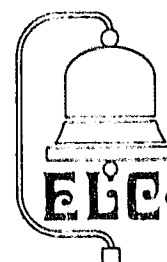
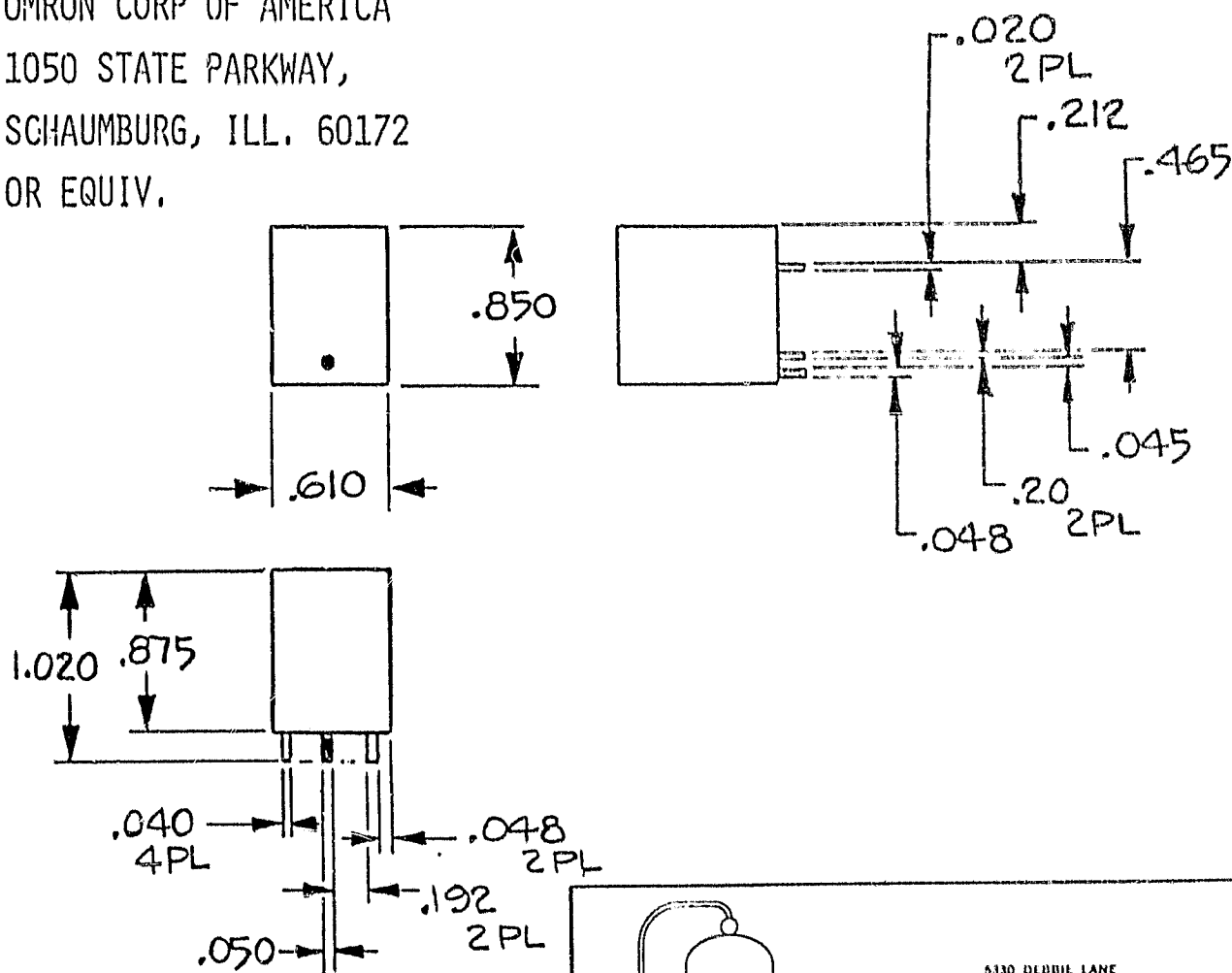
5330 DEBOIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

Contractor License No. 290399

TOLERANCES	REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	AP 15		
.XX ± 0.0	1			PART NAME		
.XXX ± 0.0	2			UA 7812 VOLTAGE REGULATOR		
ANGULAR ±	3			DRAWN BY	SCALE	MATERIAL
DRAFT	4			THOMSON	NONE	SEE NOTE 1
VENDOR'S	5			CHK'D	DATE	DRAWING NO
TOL					2 DEC 76	ESP-A15
APPLY				TRACED	APP'D	

NOTES:

1. LCIC-UADC12 RELAY  
PART NO. LCIC-UADC12
2. SUGGESTED SOURCE(S) OF SUPPLY:  
OMRON CORP OF AMERICA  
1050 STATE PARKWAY,  
SCHAUMBURG, ILL. 60172  
OR EQUIV.



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954-8678

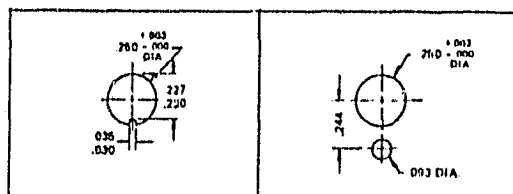
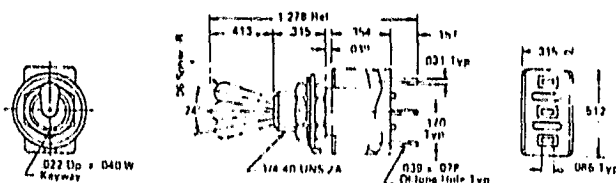
**ELEM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 16		
XX ± .00		1			PART NAME		
XXX ± .0008		2			LCIC-UADC12 RELAY		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	FULL	SEE NOTE 1
		5			CHK D	DATE	DRAWING NO
		6			TRACED	NOV 76	ESP-A16
						APP D	

# NOTES:

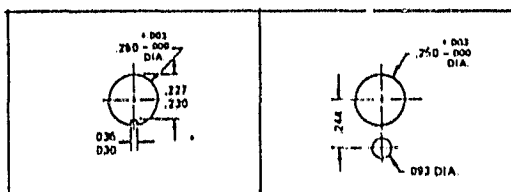
1. SPST SWITCH  
PART NO. MTA-106D  
TYPE-SPST , 6AMP@125 VAC
2. SUGGESTED SOURCE(S) OF SUPPLY:  
ALCO ELECTRONIC PRODUCTS INC  
FSCM NO.95146  
OR EQUIV



## RECOMMENDED PANEL CUTOUTS

TOLERANCES	REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	AP 17		
XX ± 0.0 —	1			PART NAME		
.XXX ± 0.0 —	2			SPST SWITCH		
ANGULAR ±	3			DRAWN BY		
DRAFT	4			THOMSON		
	5			SCALE		
	6			NONE		
				DATE		
				30 NOV 76		
				MATERIAL		
				SEE NOTE 1		
				DRAWING NO		
				ESP-A17		

2. SUGGESTED SOURCE(S) OF SUPPLY:  
ALCO ELECTRONIC PRODUCTS INC  
FSCM NO.95146  
  
OR EQUIV



# ELCAM, INC.

Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 18
.XX ± 0.0 —		1			PART NAME
.XXX ± 0.0 —		2			SPDT SWITCH -CENTER OFF
ANGULAR ±		3			DRAWN BY
DRAFT		4			THOMSON
71		5			CHECKED
		6			SCALE NONE
					DATE 30 NOV 76
					MATERIAL SEE NOTE 1
					DRAWING NO
					APP'D
					ESP-A18

# NOTES:

1. DIODE

PART NO. IN4002

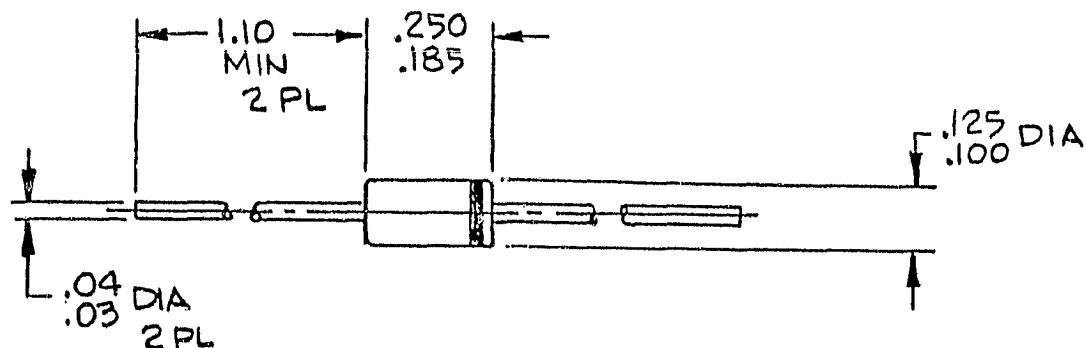
2. SUGGESTED SOURCE(S) OF SUPPLY:

MOTOROLA INC. SEMI-COND PRODUCTS DIV

FSCM NO. 04713

OR EQUIV

3. NON-REPETITIVE PEAK SURGE CURRENT ( $I_{FM}[SURGE]$ ) = 30A (FOR 1 CYCLE) @ 75°C AMB
4. AVERAGE RECTIFIED FORWARD CURRENT ( $I_o$ ) = 1.0AMP AT 75°C AMBIENT
5. PEAK REPETITIVE REVERSE VOLTAGE ( $V_{RM}[REP]$ ) = 100VDC
6. MIN. FORWARD VOLTAGE ( $V_F$  MIN) = 0.7V AT 0.1 AMP, 25°C
7. MAX. FORWARD VOLTAGE ( $V_F$  MAX) = 1.1V AT 1.0 AMP, 25°C
8. MAX. REVERSE CURRENT ( $I_R$  MAX) = 10μA, 25°C AT 100V



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TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 19		
XX ± .00		1			PART NAME		
XXX ± .00		2			IN4002 DIODE		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE NONE		
		6			DATE 2 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO		
					TRACED		
					APP D		
					ESP-A19		

# NOTES:

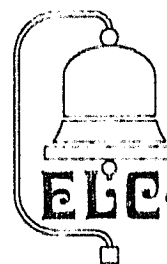
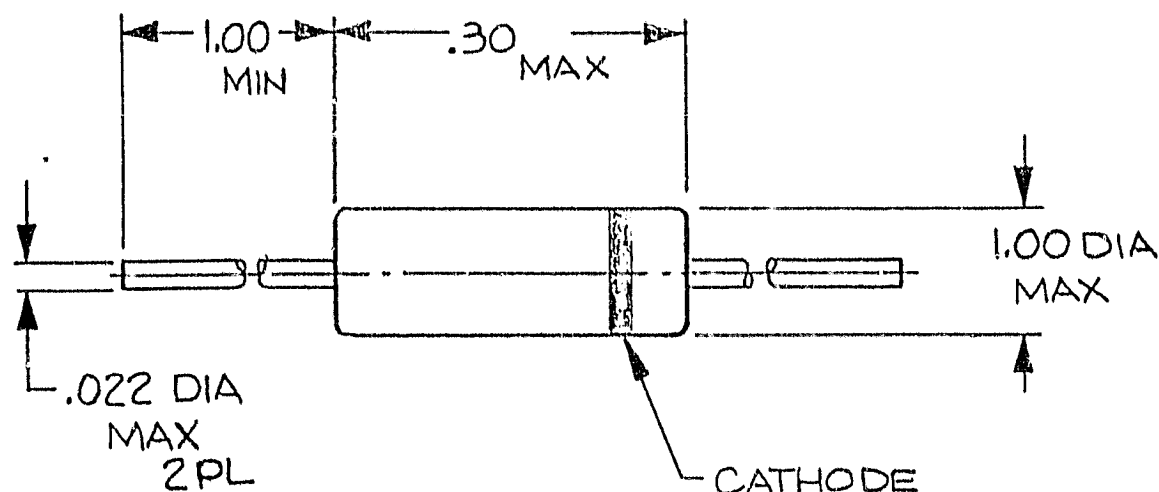
1. ZENER DIODE  
TYPE IN5231B

2. ZENER REGULATOR VOLTAGE ( $V_Z$ ) = 5.1 VDC  $\pm 5\%$   
3. TEST CURRENT ( $I_Z$ ) = 20 MA  
4. MAXIMUM ZENER REGULATOR CURRENT ( $I_{ZM}$ ) = 200 MA  
5. POWER DISSIPATION ( $P_T$ ) = 500 MW

6. SUGGESTED SOURCE(S) OF SUPPLY:

TEXAS INSTRUMENTS INC

FSCM NO. 01295



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TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 20		
XX ± 00 =		1			PART NAME		
XXX ± 00 =		2			IN5231B ZENER DIODE		
ANGULAR +		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE		
					NONE		
					3 DEC 76		
					MATERIAL		
					SEE NOTE 1		
					DRAWING NO		
					ESP-A20		



NOTES:

1. AC-DC LED LAMP  
28 VOLTS  
COLOR = GREEN
2. SUGGESTED SOURCE(S) OF SUPPLY:  
I.D.I. ELECTRIC CANADA LTD  
FSCM No. 51144,  
XCITON CORP  
FSCM NO. 53184  
OR EQUIV

TABLE I

PART NO.	VENDOR PART NO.	
	IDI	XCITON
AP 21	B4304 HI	XC556 OR XC 5053



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954-6676

**ELCAM, INC.**

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TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 21	
XX ± 0.0 -		1	4/15/77	J.C.	PART NAME	
XXX ± 0.0 -		2			LED-LAMP	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			SCALE NONE	
					DATE 3 DEC 76	
					MATERIAL SEE NOTE 1	
					DRAWING NO	
					FSP-A21	

NOTES:

1. FUSE

CURRENT RATING = 3AMP, 250V

PART NO. 312003

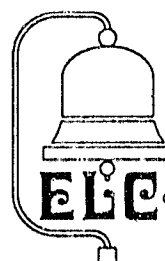
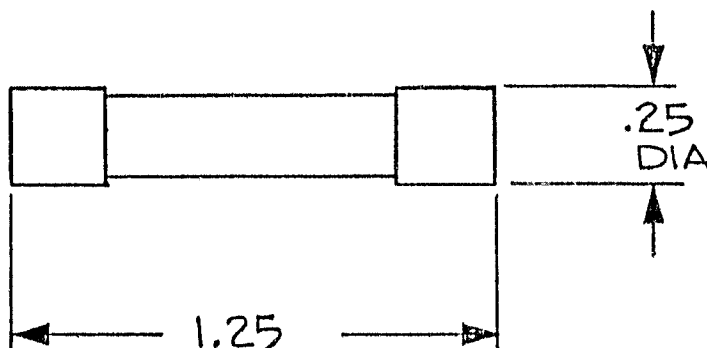
TYPE 3AG

2. SUGGESTED SOURCE(S) OF SUPPLY:

LITTLEFUSE INC

FSCM NO. 75915

OR EQUIV



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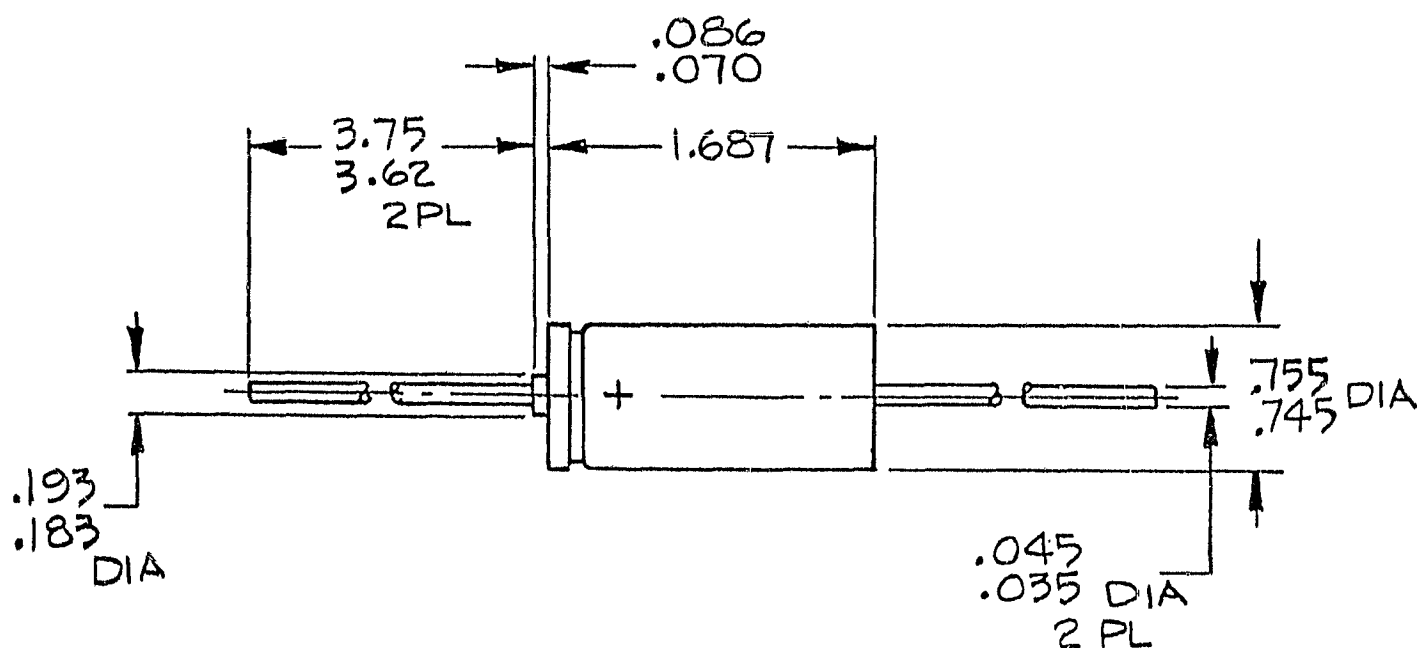
Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 23		
XX ± .00 —		1			PART NAME		
XXX ± .00 —		2			FUSE		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	2/1	SEE NOTE 1
		5			CHK D	DATE	DRAWING NO
		6			TRACED	3 DEC 76	ESP-A23
						APP D	

75

# NOTES:

1. CAPACITOR, TANTALUM  
PART NO. WBR 1000-25  
1000 MF, 25VDC,
2. SUGGESTED SOURCE(S) OF SUPPLY:  
CORNING-DUBILIER ELECTRONICS  
FSCM NO. 09023  
OR EQUIV



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964-8676

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TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 24		
.XX ± 0.0		1			PART NAME		
.XXX ± 0.0		2			CAPACITOR, 1000MF		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	FULL	SEE NOTE 1
		5			CHK D	DATE	DRAWING NO
		6			TRACED	3 DEC 76	ESP-A24
					APP D		

# NOTES:

1. CAPACITOR, TANTALUM

PART NO. WBR 100-25

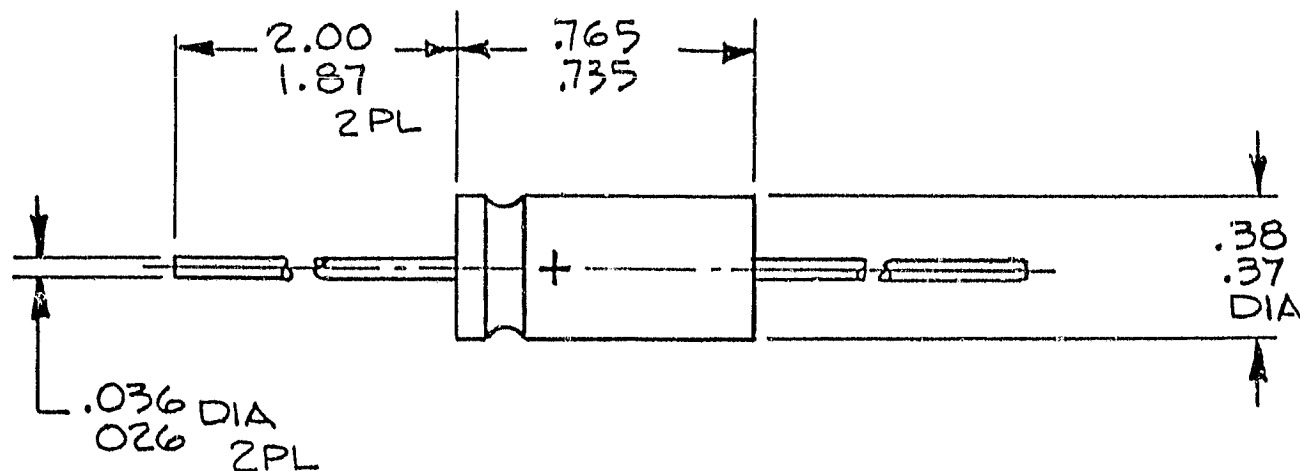
100 MF, 25V

2. SUGGESTED SOURCE(S) OF SUPPLY:

CORNING-DUBILIER ELECTRONICS

FSCM NO. 09023

OR EQUIV



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SANTA BARBARA, CALIF. 93111  
954-8676

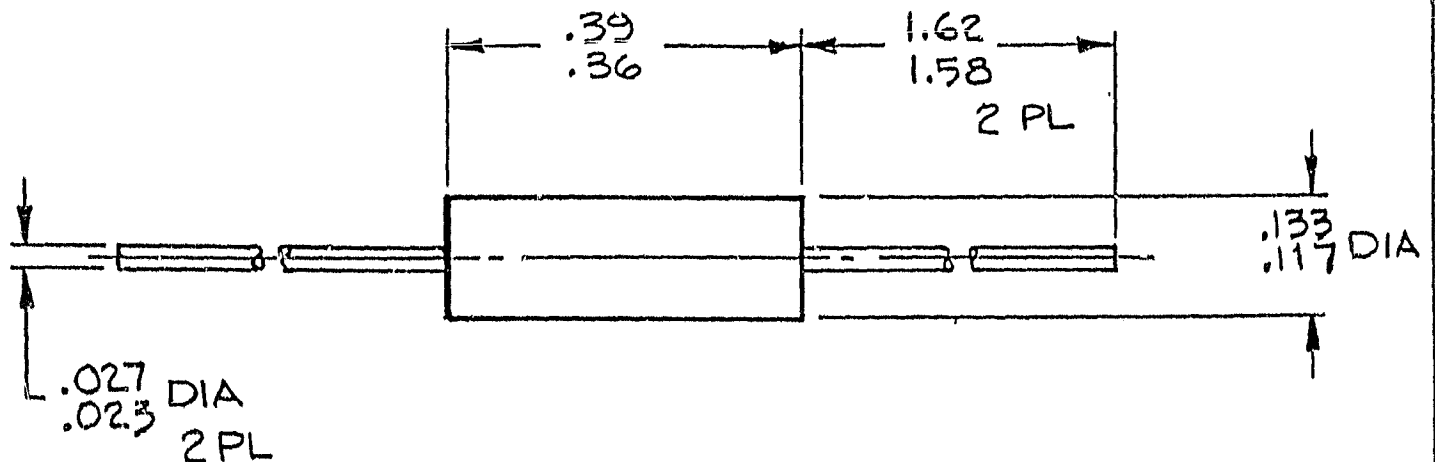
**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 25	
XX ± 00 —		1			PART NAME	
XXX ± 00 —		2			CAPACITOR, 100 MF	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			SCALE	
					2/1	
					DATE	
					3 DEC 76	
					APP'D	
					TRACED	
					MATERIAL	
					SEE NOTE 1	
					DRAWING NO	
					ESP-A25	

# NOTES:

1. RESISTOR, FIXED  
20 K , $\pm 1\%$ , .25 WATT,  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8076

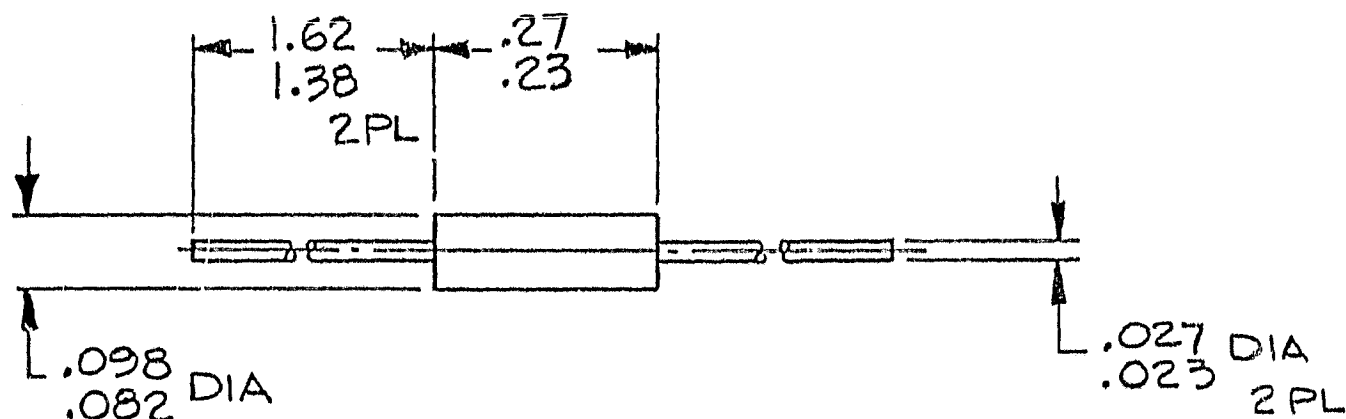
**ELECRAM, INC.**

Contractors License No 290399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX $\pm$ .00 — XXX $\pm$ .00 — ANGULAR $\pm$ DRAFT	<b>REVISIONS</b>			<b>PART NUMBER</b>	
	NO	DATE	BY	AP 28	
	1			PART NAME	
	2			RESISTOR, 20K	
	3			DRAWN BY	
	4			THOMSON	SCALE
	5			CHK D	DATE
				TRACED	3 DEC 76
					APP D
					MATERIAL
					SEE NOTE 1
					DRAWING NO
					ESP-A28

# NOTES:

1. RESISTOR, FIXED  
75K,  $\pm 5\%$ , .25 WATT  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5230 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
964-8576

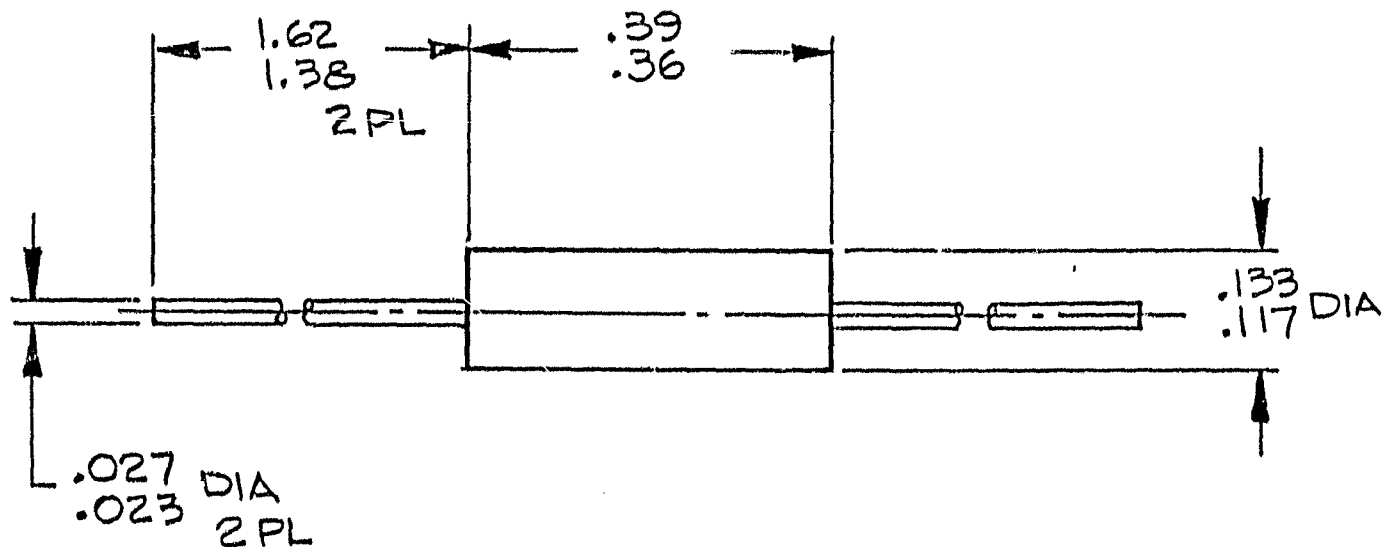
**ELECTAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 29		
XX ± 00 —		1			PART NAME		
XXX ± 00 —		2			RESISTOR, 75K		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE		
		6			NONE		
					DATE		
					3 DEC 76		
					MATERIAL		
					SEE NOTE 1		
					DRAWING NO		
					ESP-A29		

NOTES:

1. RESISTOR, FIXED  
5.11K,  $\pm 1\%$  .25 WATT  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

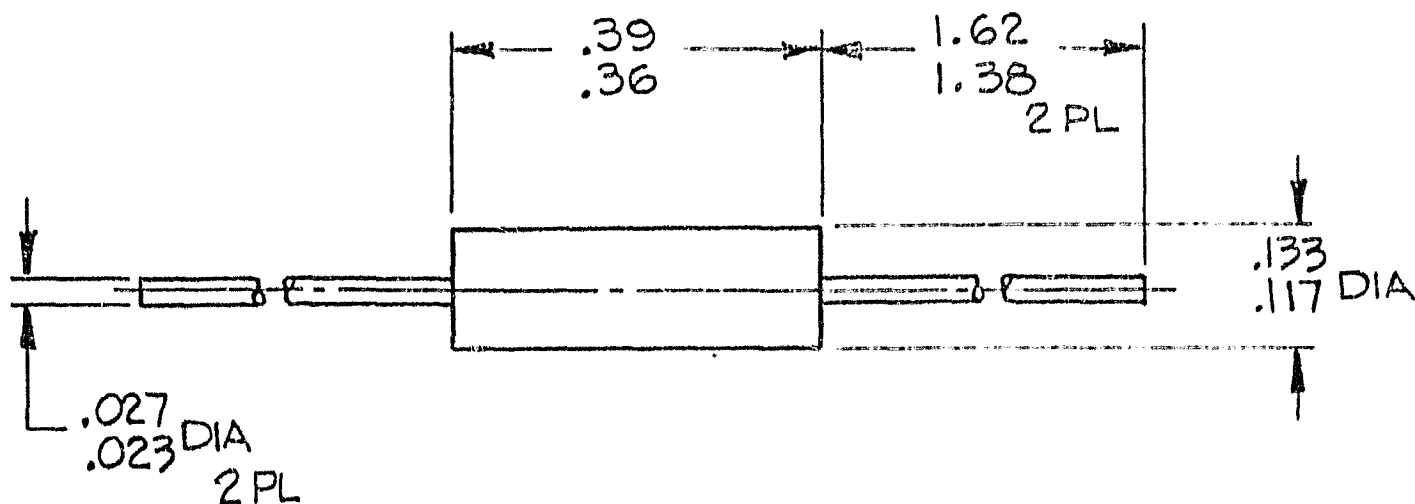
**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 30		
XX $\pm$ 00		1			RESISTOR, 5.11K		
XXX $\pm$ 00		2					
ANGULAR $\pm$		3			DRAWN BY THOMSON		
DRAFT		4			SCALE NONE		
		5			DATE 4 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO. ESP-A30		
					TRACED		
					APP'D		

# NOTES:

1. RESISTOR, FIXED  
2K,  $\pm 1\%$ , .25 WATT  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
904 8676

**ELEM, INC.**

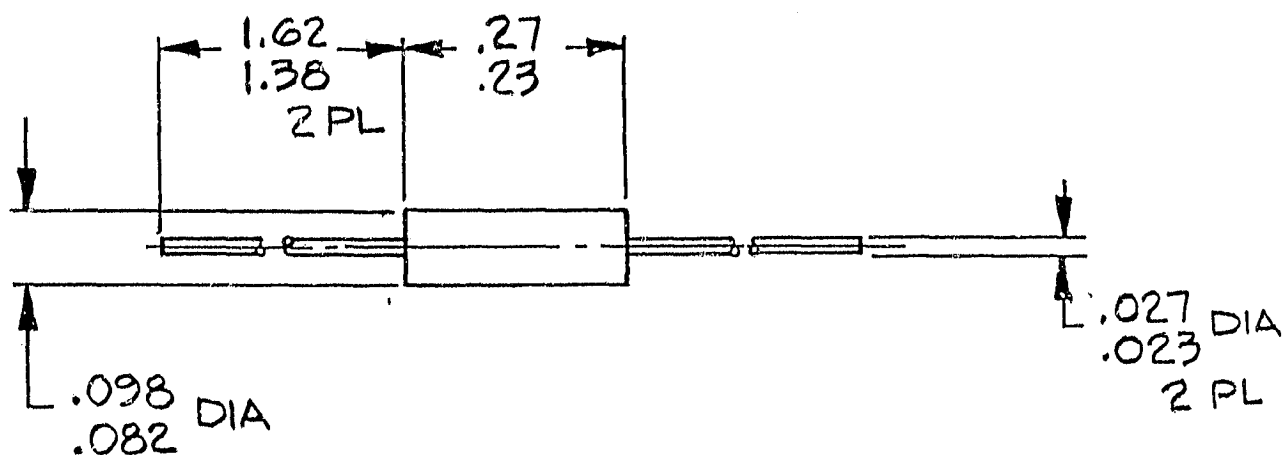
Contractors License No. 29,399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	AP 32	
XX + .00		1		PART NAME	
XXX + .00		2		RESISTOR, 2K	
ANGULAR ±		3		THOMSON	
DRAFT		4		DATE 4 DEC 76	
		5		SCALE NONE, SEE NOTE 1	
				APPROVED	
				ESP-32	



# NOTES:

1. RESISTOR, FIXED  
1.0K,  $\pm 5\%$ , .25 WATT  
TYPE, CB
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

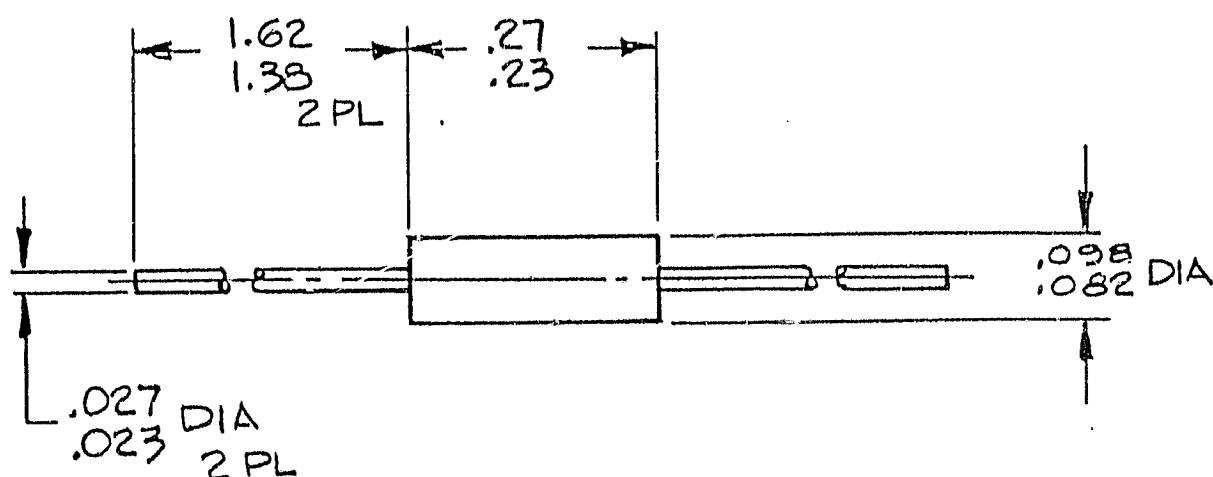
**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 34		
.XX $\pm$ 0.0		1			PART NAME		
.XXX $\pm$ 0.0		2			RESISTOR, 1.0K		
ANGULAR $\pm$		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE		
					NONE		
					DATE		
					4 DEC 76		
					DRAWING NO		
					ESP-34		

# NOTES:

1. RESISTOR, FIXED  
10K,  $\pm 5\%$ , .25 WATT  
TYPE, CB
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
954-8676

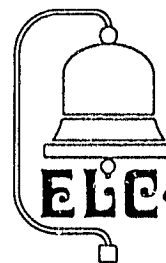
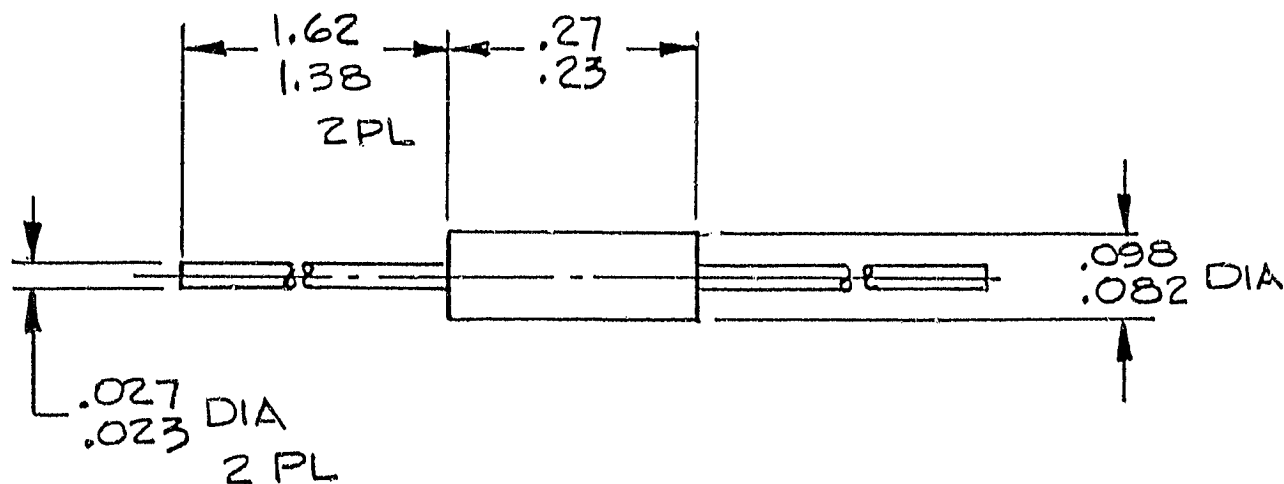
**ELEC RAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL:		NO	DATE	BY	AP 35	
XX $\pm$ 00		1			PART NAME	
XXX $\pm$ 00		2			RESISTOR, 10K	
ANGULAR $\pm$		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			CHK D	
					TRACED	
					SCALE	
					DATE	
					4 DEC 76	
					APP D	
					MATERIAL	
					SEE NOTE 1	
					DRAWING NO	
					ESP-A35	

# NOTES:

1. RESISTOR, FIXED  
390 OHMS,  $\pm 10\%$ , .25 WATT  
TYPE CB
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

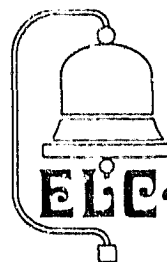
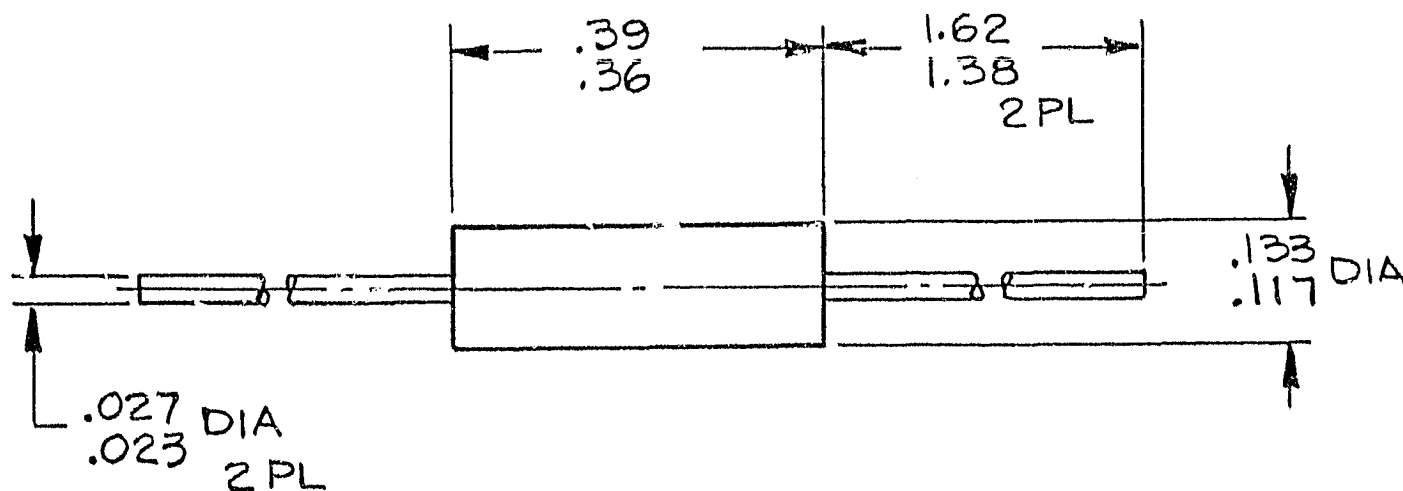
**ELEM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	A 36	
XX $\pm 0.0$		1			PART NAME RESISTOR, 390 $\Omega$	
XXX $\pm 0.0$		2				
ANGULAR $\pm$		3			DRAWN BY THOMSON	SCALE NONE
DRAFT		4			DATE 4 DEC 76	MATERIAL SEE NOTE 1
		5			TRACED	DRAWING NO ESP-A36

NOTES:

1. RESISTOR, FIXED  
100K,  $\pm 1\%$ , .25 WATT  
TYPE: CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANT, BARBARA, CALIF 93111  
964-8676

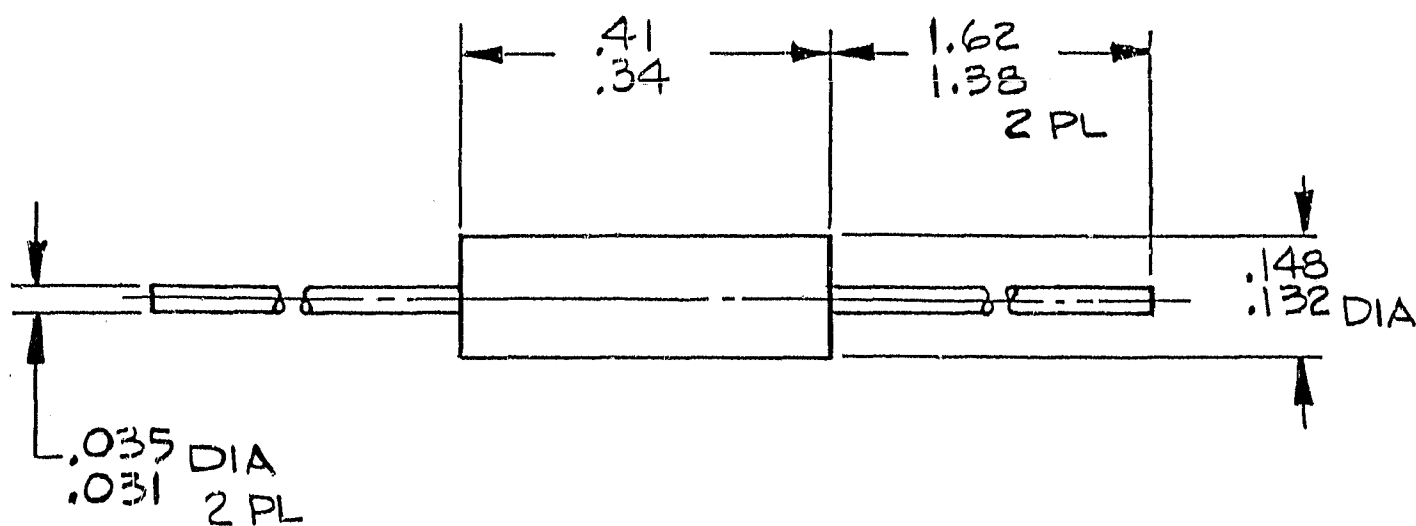
**ELCAM, INC.**

Contractors License No 290399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX + .00 — (XX ± .00 — ANGULAR ± DRAFT	<b>REVISIONS</b>			<b>PART NUMBER</b>	
	NO	DATE	BY	AP 37	
	1			PART NAME	
	2			RESISTOR, 100K	
	3			DRAWN BY	
	4			THOMSON	SCALE NONE
	5			CHK D	DATE 2 DEC 76
				TRACED	APP D
					MATERIAL SEE NOTE 1
					DRAWING NO
					ESP-A37

NOTES:

1. RESISTOR, FIXED  
2.2K,  $\pm 5\%$ , .50 WATT  
TYPE, EB
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

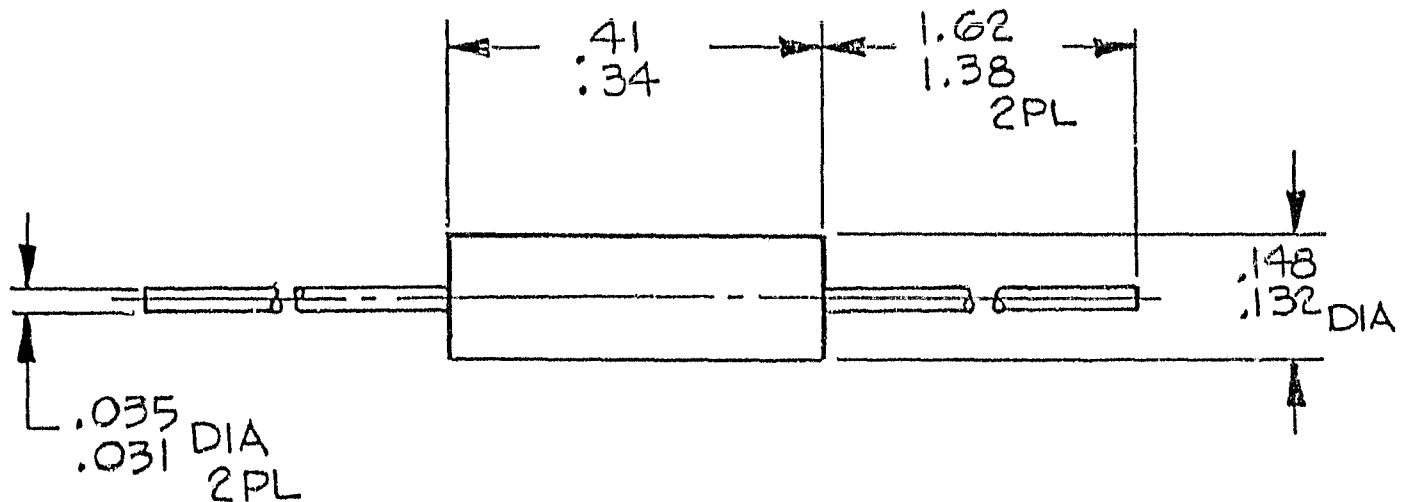
**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 38	
.XX $\pm$ 0.0		1			PART NAME RESISTOR, 2.2K	
.XXX 0.0		2				
ANGULAR $\pm$		3			DRAWN BY THOMSON	
DRAFT		4			SCALE NONE	
		5			DATE 4 DEC 76	
					MATERIAL SEE NOTE 1	
					DRAWING NO ESP-A38	
					TRACED	

NOTES:

1. RESISTOR, FIXED  
680 OHMS,  $\pm 10\%$ , .50 WATT  
TYPE, EB
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
864-6676

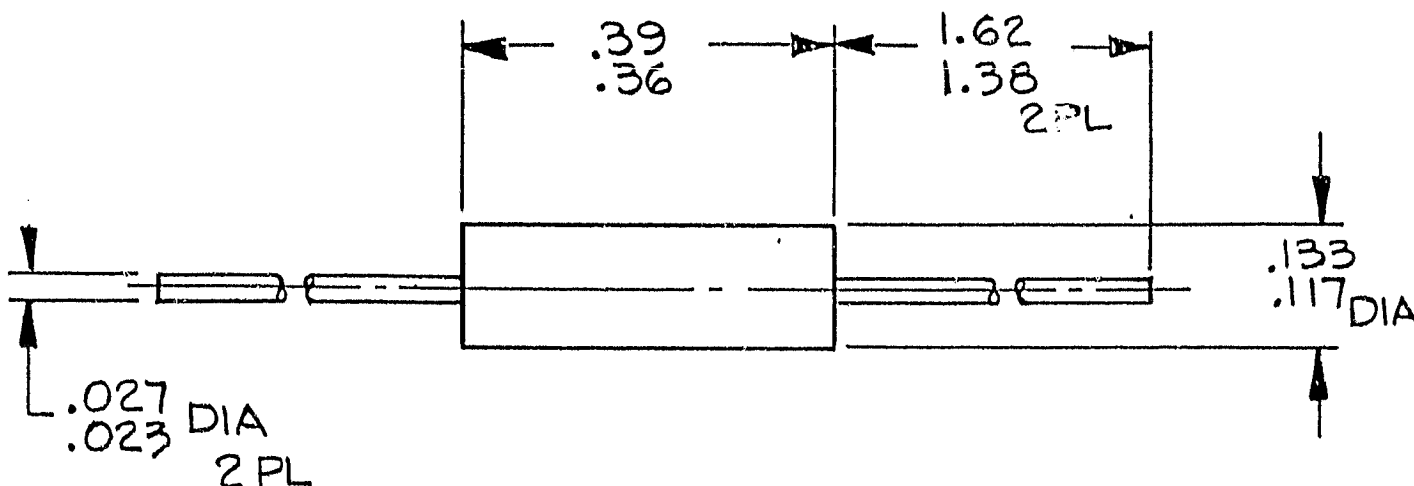
**ELEM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 39
XX $\pm$ .00 —		1			PART NAME RESISTOR, 680 $\Omega$
XXX $\pm$ .00 —		2			
ANGULAR $\pm$		3			
DRAFT		4			
87		5			DRAWN BY THOMSON
					SCALE NONE
					DATE 4 DEC 76
					MATERIAL SEE NOTE 1
					DRAWING NO ESP-A39

NOTES:

1. RESISTOR, FIXED  
4.75K,  $\pm 1\%$ , .25 WATT  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

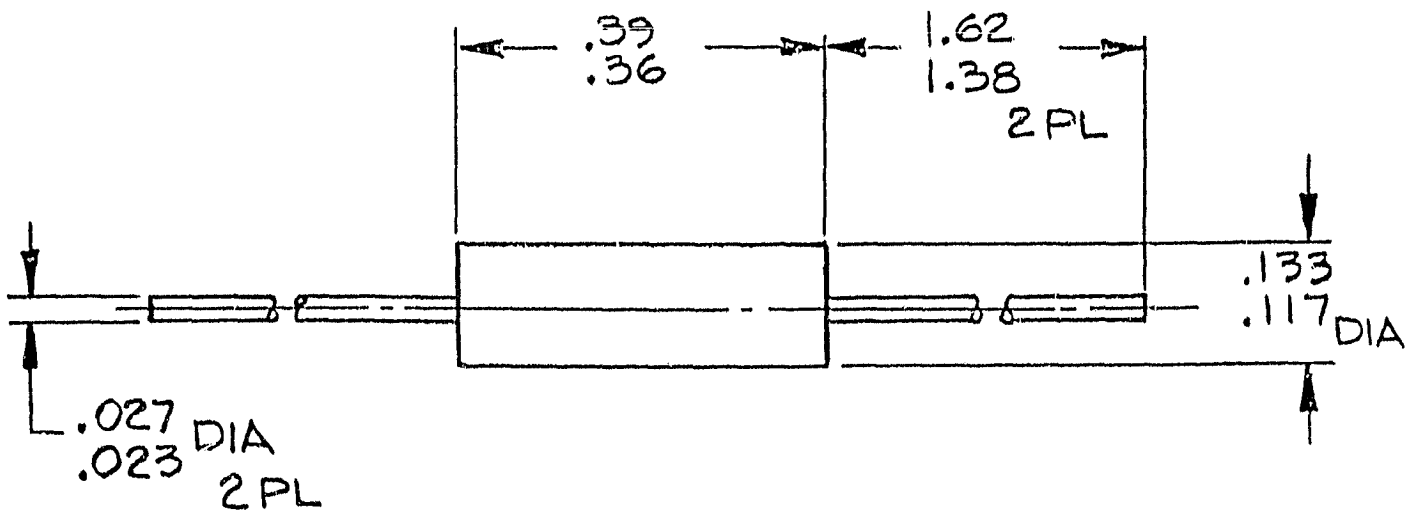
**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 41		
XX $\pm$ 0.0 —		1			PART NAME		
XXX $\pm$ 0.0 —		2			RESISTOR, 4.75K		
ANGULAR $\pm$		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE NONE		
					DATE 4 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO		
					ESP-A41		

NOTES:

1. RESISTOR, FIXED  
4.64K  $\pm 1\%$ , .25 WATT  
TYPE, CERMET FILM
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO, 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
964-8676

**ELEM, INC.**

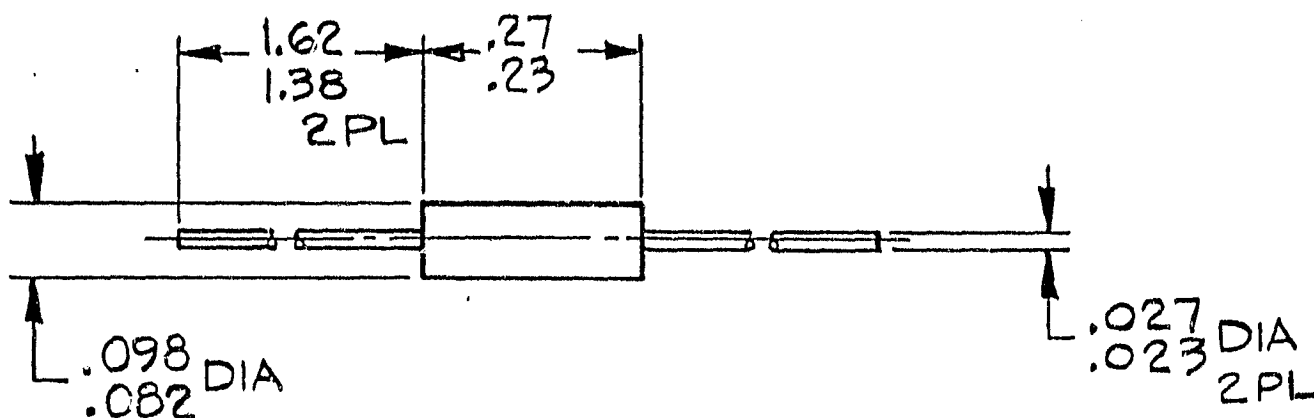
Contractors License No 290399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX $\pm$ .00 XXX $\pm$ .00 ANGULAR $\pm$ DRAFT	<b>REVISIONS</b>			<b>PART NUMBER</b>	
	NO	DATE	BY	AP 42	
	1	1/12/76	GL	PART NAME	
	2			RESISTOR, 4.64K	
	3			DRAWN BY THOMSON	
	4			SCALE NONE	MATERIAL SEE NOTE 1
	5			DATE 4 DEC 76	DRAWING NO
				APP D	ESP-A42



NOTES:

1. RESISTOR, FIXED  
160K,  $\pm 5\%$  .25 WATT.
2. CONTINUOUS AMBIENT TEMP  
70°C WITHOUT POWER DERATING
3. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO.  
FSCM NO. 01121  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
864-8676

**ELEM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 44		
XX $\pm$ 0.0 —		1			PART NAME		
XXX $\pm$ 0.0 —		2			RESISTOR, 160K		
ANGULAR $\pm$		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	NONE	SEE NOTE 1
		5			CHK D	DATE	DRAWING NO
						4 DEC 76	
					TRACED	APP D	ESP-A44

# NOTES:

## 1. POTENTIOMETER

TOP ADJUST

10K,  $\pm 20\%$ , .25 WATT

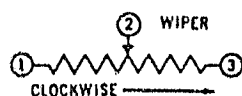
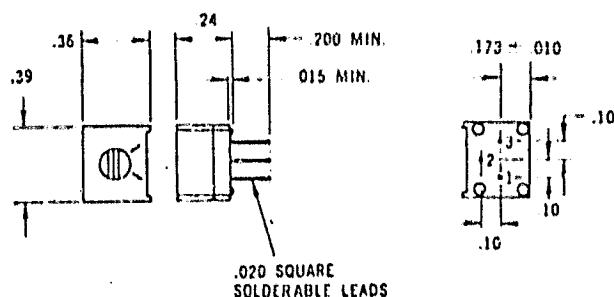
PART NO. 3389P-1-103

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

BOURNS INC. TRIMPOT

FSCM NO. 32997

OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
864-8676

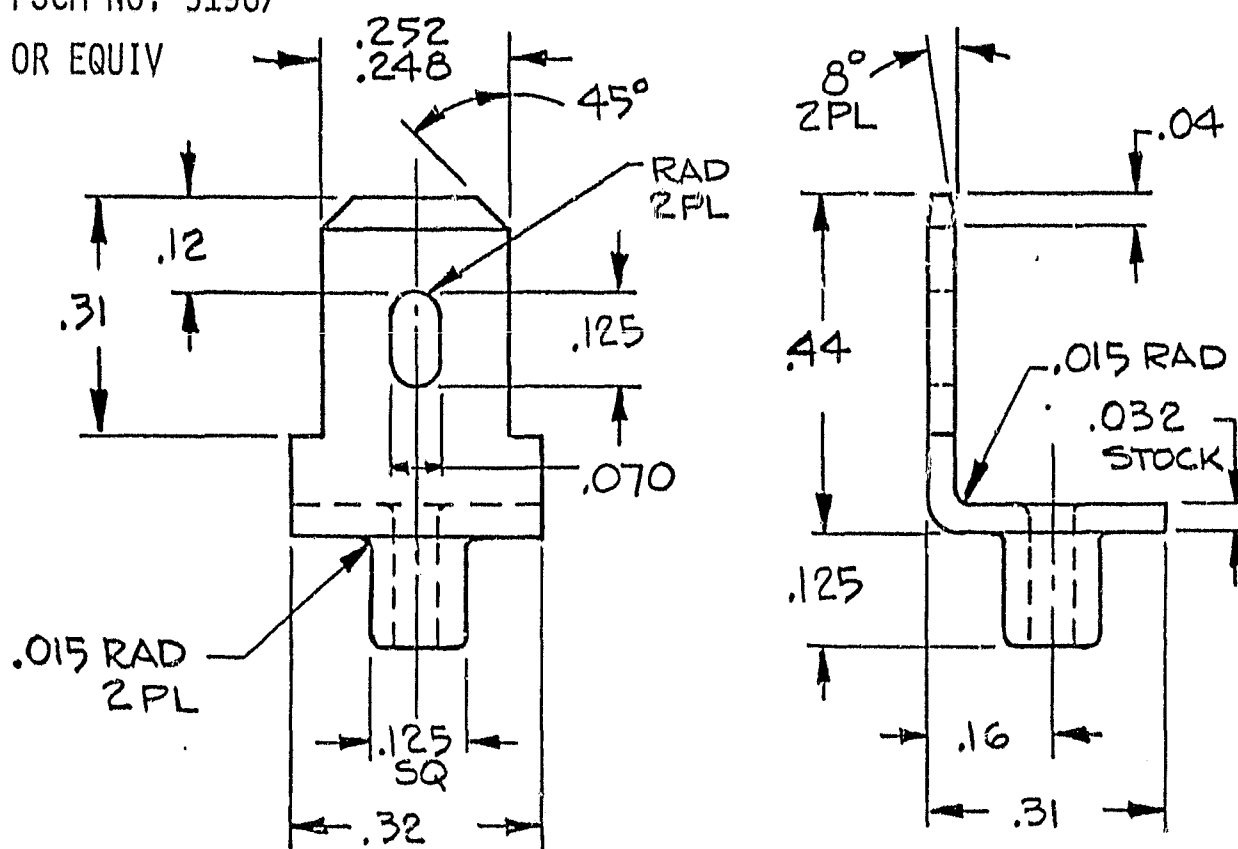
**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 45		
XX $\pm$ .001		1			PART NAME		
XXX $\pm$ .0005		2			POTENTIOMETER		
ANGULAR $\pm$		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE NONE		
					DATE 4 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO		
					ESP-A45		

# NOTES:

1. TERMINAL, SQUARE BARREL  
BRASS, TIN PLATED  
PART NO. 4484
2. SUGGESTED SOURCE(S) OF SUPPLY:  
NATIONAL TEL-TRONICS DIV,  
EASTERN AIR DEVICES INC  
F3CM NO. 91967  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
804-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 46		
XX ± 0.01		1			PART NAME		
XXX ± 0.005		2			TERMINAL, SQUARE BARREL		
ANGULAR ± 0°30'		3			DRAWN THOMSON		
DRAFT		4			SCALE 4/1		
		5			DATE 4 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO		
					ESP-A46		

NOTES:

1. MATERIAL

STEEL, ZINC CHROMATE  
FINISH. CADMIUM OPTIONAL

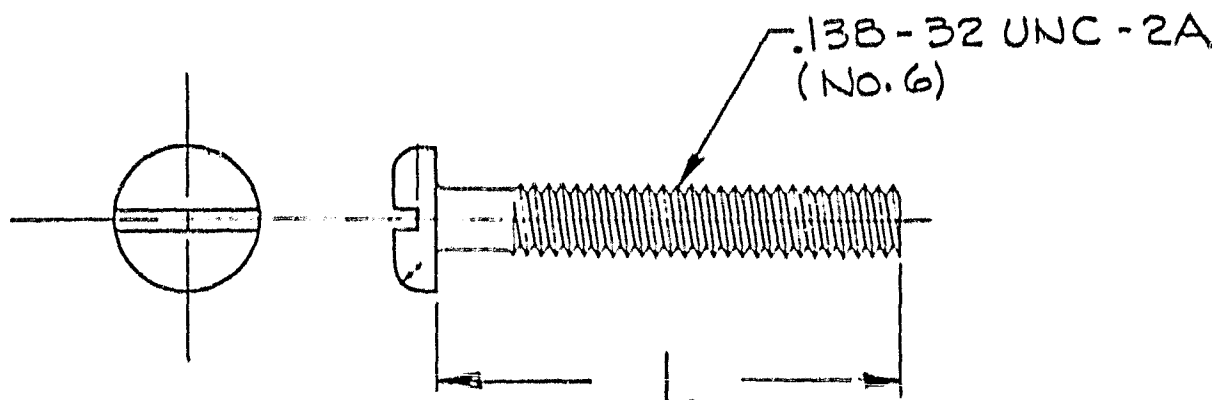


TABLE I

PART NO.	L
AP48-001	.25
AP48-002	.32
AP48-003	.38
AP48-004	.44



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
954-8676

**ELCAM, INC.**

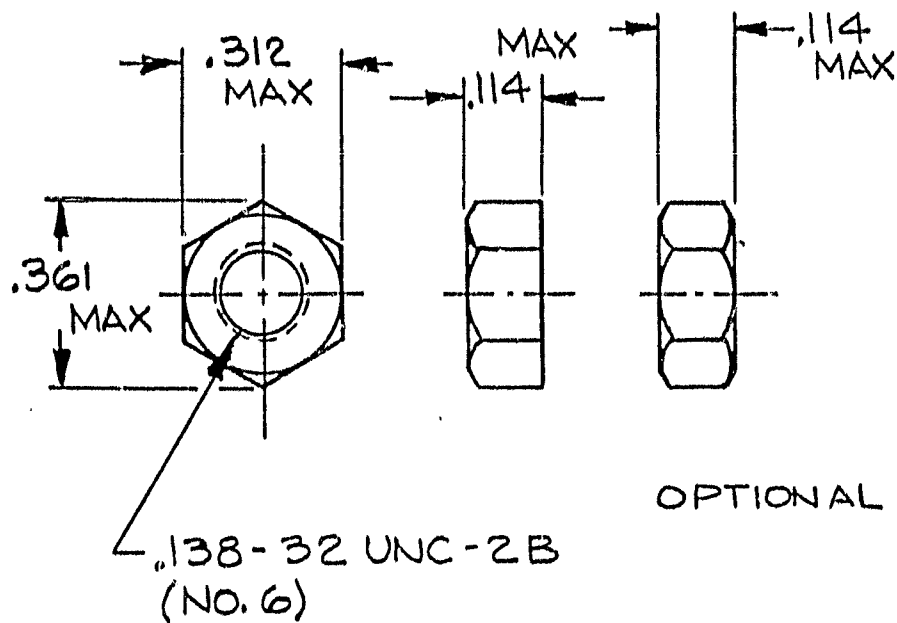
Contractors License No 290399

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX ± .00 — XXX ± .00 — ANGULAR ± DRAFT:		<b>REVISIONS</b> <table border="1"> <tr> <th>NO</th> <th>DATE</th> <th>BY</th> </tr> <tr><td>1</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td></tr> </table>		NO	DATE	BY	1			2			3			4			5			<b>PART NUMBER</b> AP48	
NO	DATE	BY																					
1																							
2																							
3																							
4																							
5																							
		<b>PART NAME</b> SCREW, PAN HD																					
		DRAWN BY THOMSON		SCALE NONE																			
		DATE 4 DEC 76		MATERIAL SEE NOTE 1																			
		TRACED		DRAWING NO ESP-48																			

# NOTES:

## 1. MATERIAL:

STEEL, ZINC CHROMATE  
PLATED. CADMIUM OPTIONAL



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

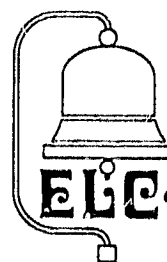
**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP51		
XX ± .00 -		1			PART NAME		
XXX ± .00 -		2			NUT, HEX		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	NONE	SEE NOTE 1
		5			CHK'D	DATE	DRAWING NO
		6			TRACED	5 DEC 76	ESP-A51
						APP'D	

# NOTES:

1. LM3911 TEMPERATURE  
CONTROLLER IC  
SINGLE MONOLITHIC CHIP  
OPER TEMP RANGE - 25°C-+85°C
2. SUGGESTED SOURCE(S) OF SUPPLY:  
NATIONAL SEMICONDUCTOR CORP  
FSCM NO.27014  
OR EQUIV.



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
954-8676

**ELEM, INC.**

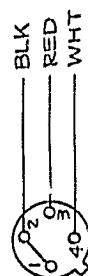
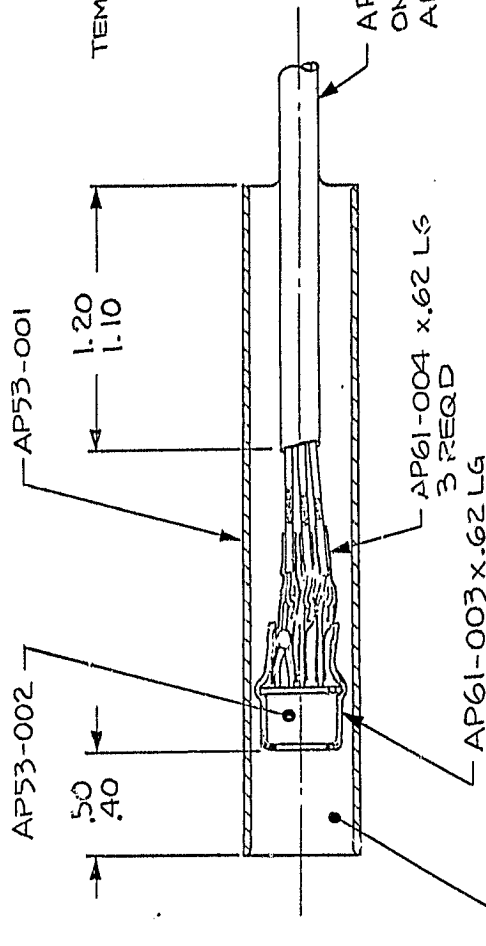
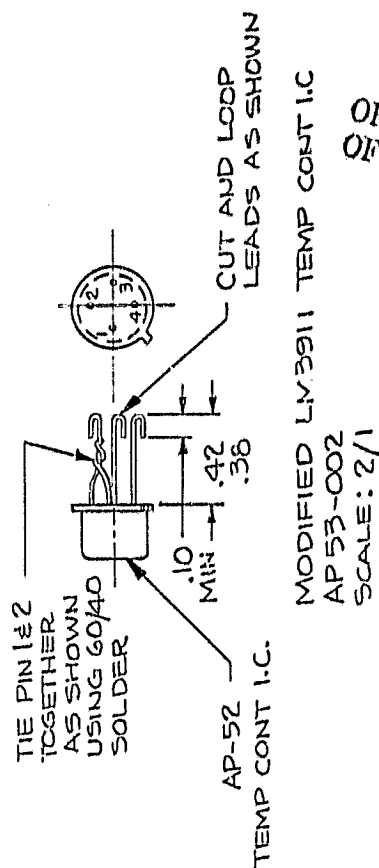
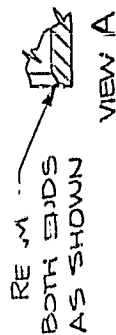
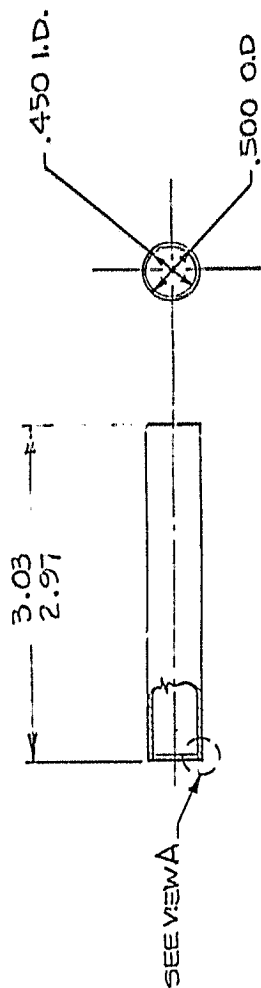
Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	AP 52		
XX ± 0.0	1			PART NAME		
XXX ± 0.0	2			LM3911 TEMP CONT IC		
ANGULAR ±	3			DRAWN BY	SCALE	MATERIAL
DRAFT	4			THOMSON	NOTE	SEE NOTE 1
	5			CHK'D	30 NOV 76	DRAWING NO
				TRACED	APP'D	ESP-A52

95


NOTES:

1. COMPOUND MUST BE FLUSH TO .01 BELOW SHELL SURFACE.
2. ASSEMBLE COMPONENTS PER ENGINEERING SPEC.



SENSOR CARTRIDGE

ORIGINAL PAGE IS  
OF POOR QUALITY

 <p><b>EBERHARD, INC.</b> CORPORATION, LONDON, ENGLAND</p>	
<p>DATE: _____</p> <p>BY: _____</p> <p>FOR: _____</p> <p>REVISION: _____</p>	<p>PART NUMBER: <b>AP53</b></p> <p>SUB- SENSOR CARTRIDGE ASSY</p> <p>REVISED: <b>2A</b> <b>FREE/D</b></p> <p>ESPA53</p>

# NOTES:

1. RESISTOR, FIXED  
.25 WATT,  $\pm 10\%$   
TYPE, CB
2. AT ASSEMBLY - SELECT ONE FROM THE  
FOLLOWING VALUES IN TABLE I.
3. CALIBRATE SENSOR ASSEMBLY PER  
ENGINEERING SPEC.
4. SUGGESTED SOURCE(S) OF SUPPLY:  
ALLEN BRADLEY CO,  
FSCM NO. 01121  
OR EQUIV

TABLE I  
(SEE NOTE 2)

PART NO.	VALUE IN OHMS
AP 54 - 001	2.7
AP 54 - 002	3.0
AP 54 - 003	3.3
AP 54 - 004	3.9
AP 54 - 005	4.7
AP 54 - 006	5.1
AP 54 - 007	5.6
AP 54 - 008	6.8
AP 54 - 009	8.2
AP 54 - 010	9.1
AP 54 - 011	10
AP 54 - 012	15
AP 54 - 013	20

TABLE I CONTINUED

PART NO.	VALUE IN OHMS
AP 54 - 014	22
AP 54 - 015	27
AP 54 - 016	30
AP 54 - 017	33
AP 54 - 018	39
AP 54 - 019	47
AP 54 - 020	51
AP 54 - 021	56
AP 54 - 022	68
AP 54 - 023	75
AP 54 - 024	82
AP 54 - 025	100
AP 54 - 026	110
AP 54 - 027	120
AP 54 - 028	150



5330 D'ORIE LANE  
SANTA BARBARA, CALIF. 93111  
864-8676

**ELECAM, INC.**

Contractors since No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO.	DATE	AP 54	
XX + .00 -		1		PART NAME	
XXX + .00 -		2		RESISTOR, CALIBRATION	
ANGULAR ±		3		DRAWN BY	SCALE
DRAFT		4		THOMSON	NONE
		5		CHK'D	DATE
		6			5 DEC 76
				TRACED	APP'D
97				MATERIAL SEE NOTE 1 DRAWING NO ESP-A54	



1. STRIP ENDS OF LEADS .25-.30  
AND SOLDER TO TERMINALS  
USING 60-40 SOLDER.

2. AFTER ASSEMBLE CHECK  
CABLE PER ENGINEERING  
SPEC.

SPECIALIZE IN  
COURT REPORTING

CRIME PAGE TYPE  
SECTION 2 NUMBER 05  
50 WIDE. MIN 2 WIDE

SENSOR CARTRIDGE  
AP53

3 CONDUCTOR  
CABLE  
AP62

FEMALE TERMINAL-  
 FLAG TYPE  
 AP58-001  
 4REQD

—see view A.

WIRE 22 AWG  
PVC INSUL. COLOR  
YELLOW

COLOR	LENGTH
WHT	1.8-1.9
BLK	1.6-1.9
RED	1.3-1.4

- SLEEVE  
AP61-004

RESISTOR  
TEST TABLE I

SLEEVE;  
HEAT SHRINKABLE  
AP61-001

FOODS FOR

3-874  
HIGHT

VIEW A

TABLE I

PART NO.	CABLE LENGTH	MARK IDENT LABEL	REMARKS
AP57-001	120" - 124"	DAY-MONTH-YEAR IE: 211176-SXX	SELECT TYPIM REC AP54 TO CALIBRATE PER ENGR SPEC



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**ELBEM, INC.**

[illegible]

AD57

ASSA = 187J DUSN=

0/11/2011

**22 NOV FSP-657**

# NOTES:

## 1. MATERIAL:

FLAG TERMINAL

FEMALE QUICK SLIDE

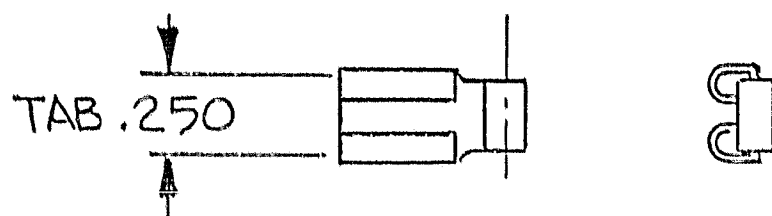
NON-INSULATED

PART NO. SEE TABLE I

## 2. VENDOR(S):

MINNESOTA MINING & MFG CO. (3M)

FSCM 75037



TAB THICKNESS .030-.032

TABLE I

PART NO.	WIRE RANGE	3M CAT NO.		
AP58-001	22-18	B32-001		



5330 DEBBIE LANE  
SANTA BARBARA CALIF 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP58
XX ± .00 —		1			PART NAME
XXX ± .00 —		2			FLAG TERMINAL
ANGULAR ±		3			DRAWN BY
DRAFT		4			THOMSON
VENDOR'S TOL APPLY		5			SCALE
		6			NONE
					DATE
					23 Nov 76
					APP'D
					SEE NOTE 1
					DRAWING NO
					ESP-A58

NOTES:

1. MATERIAL:

STEEL, CARBON

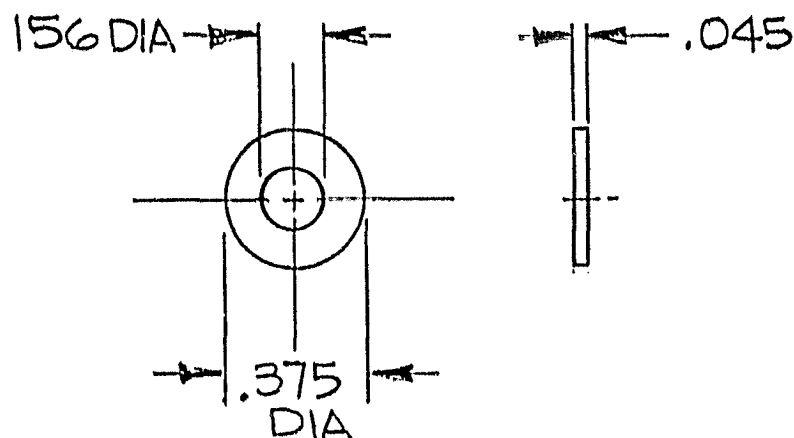
2. PROTECTIVE FINISH:

ZINC PLATE

.0002 MIN THICKNESS

CLEAR CHROMATE

SPEC QQ-Z-325



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELEM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP60		
.XX ± 0.0 -		1			PART NAME WASHER, FLAT		
.XXX ± 0.0 -		2					
ANGU. 1R ±		3					
DRAFT		4					
VENDOR'S TOL APPLY		5					
					DRAWN BY THOMSON	SCALE	MATERIAL SEE NOTE 1
					CHK'D	6 DEC 76	DRAWING NO ESP-A60
					TRACED	APP'D	

# NOTES:

## 1. MATERIAL:

INSULATION, HEAT-SHRINKABLE  
POLYVINYL CHLORIDE (PVC)

COLOR, SEE TABLE I

SIZE, SEE TABLE I

## 2. VENDOR:

PORT PLASTICS INC.

8037 E. SLAUSON AVE

MONTEBELLO, CA. 90640

### TABLE I

PART NO.	VENDOR NO.	I D	WALL	COLOR
AP61-001	FP301-.093	.093	.020	CLEAR
AP61-002	FP301-.187	.188	.025	CLEAR
AP61-003	FP301-.375	.375	.030	CLEAR
AP61-004	FP301-.093	.093	.020	BLACK
AP61-005	FP301-		.	

NOTE: RECOVERY I.D.  
AFTER SHRINKAGE  
IS APPROX  $\frac{1}{2}$  OF I.D.  
GIVEN.



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELEM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	AP61	
XX ± .00 —		1		PART NAME	
XXX ± .00 —		2		INSULATION, SHRINKABLE	
ANGULAR ±		3		DRAWN BY	SCALE
DRAFT		4		THOMSON	NONE
VENDOR'S		5		CHK'D	DATE
TOL APPLY					27 NOV 76
				TRACED	APP'D
					NOTE 1
					DRAWING NO
					ESP-A61

# NOTES:

## 1. MATERIAL:

CABLE, UNSHIELDED MULTI-CONDUCTOR.  
THREE CONDCT: WHT, BLK, & RED. PVC INSULATION.  
22 AWG, STRANDED 7/30 NOM OD .145 OVER JKT.  
JACKET INSULATION - GRAY VINYL.

## 2. VENDOR(S):

STANDARD WIRE & CABLE  
FSCM NO. 04946

ALPHA WIRE

FSCM NO. 92194



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELCAM, INC.**

Contractors License No 290399

<b>TOLERANCES</b>		<b>REVISIONS</b>		<b>PART NUMBER</b>	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	AP62	
XX ± 00 -		1		PART NAME	
XXX ± 00 -		2		CABLE	
ANGULAR ±		3		DRAWN BY	
DRAFT		4		THOMSON	
VENDOR'S		5		SCALE NONE	
TOL				DATE 27 NOV 76	
APPLY				MATERIAL SEE NOTE 1	
				DRAWING NO	
				ESP-A62	
				TRACED	
				APP'D	

# NOTES:

## 1. MATERIAL:

- A. STYCAST 2741LV IS AN EPOXIDE CASTING RESIN AND SEALING COMPOUND OF CONTROLLED FLEXIBILITY, IT IS USED FOR ELECTRONIC EMBEDMENT AND IN SEALING OR CEMENTING OF METALS, CERAMICS AND PLASTICS. STYCAST 2741LV IS SUPPLIED AS A FREE FLOWING LIQUID. IT IS USED IN CONJUNCTION WITH CATALYST 15, ALSO A LIQUID, COLOR IS BLACK.

STYCAST 2741LV CAN BE CURED AT ROOM TEMPERATURE, OR AT ELEVATED TEMPERATURE IN A SHORT PERIOD OF TIME. POT LIFE OF THE CATALYZED RESIN IS AT LEAST TWO HOURS. THE FLEXIBILITY AND HARDNESS OF CURED STYCAST 2741LV IS CONTROLLED BY THE PROPORTION OF CATALYST 15LV WHICH IS USED.

FOR A FLEXIBLE MATERIAL (SHORE DUROMETER HARDNESS 30) USE:

100 PARTS STYCAST 2741LV  
150 PARTS CATALYST 15LV

FOR A SEM-RIGID MATERIAL (SHORE DUROMETER HARDNESS 50) USE:

100 PARTS STYCAST 2741LV  
100 PARTS CATALYST 15LV

FOR A RIGID MATERIAL USE:

100 PARTS STYCAST 2741LV  
50 PARTS CATALYST 15LV

- B. CATALYST 15LV IS A FLEXIBLE HARDNER. COLOR BLACK. TEMPERATURES ABOVE 250° F SHOULD BE ORDINARILY AVOIDED.

## 2. SOURCE(S) OF SUPPLY:

EMERSON & CUMING INC

FSCM NO. 04522

ORIGINAL PAGE IS  
OF POOR QUALITY



5533 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954 8676

**ELCAM, INC.**

Contractors License No. 790309

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 63	
XX ± .00 —		1			PART NAME	
XXX ± .00 —		2			CASTING COMPOUND, EPOXY	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
		5			SCALE	
					NONE	
					DATE	
					DEC 76	
					DRAWING NO	
					ESP-A63	
					TRACED	

# NOTES:

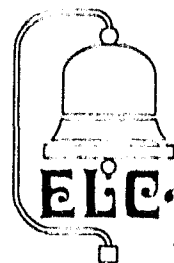
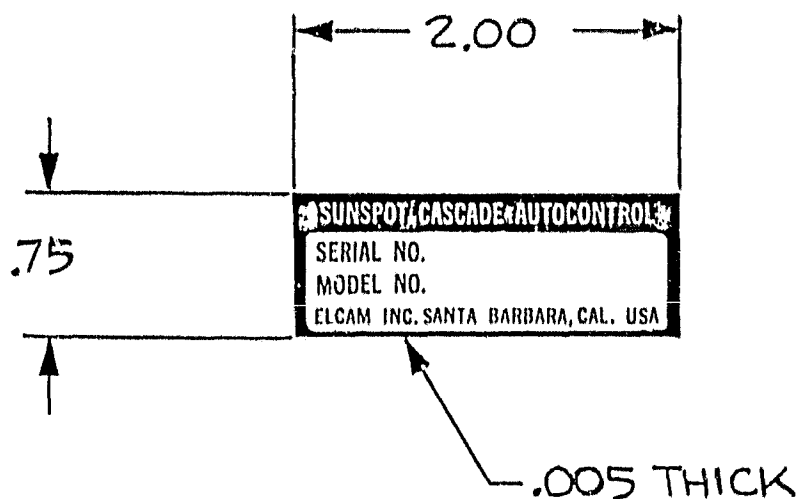
## 1. MATERIAL:

PHOTOGRAPHIC PAPER

PRESSURE SENSITIVE ADHESIVE

BACKED WITH PROTECTIVE BACKING

PAPER.



5330 DEBBIE LANE  
 SANTA BARBARA, CALIF. 93111  
 954-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 64		
XX ± .00		1			PART NAME		
XXX ± .00		2			LABEL, CIRCUIT CARD		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
		5			SCALE FULL		
		6			DATE 5 DEC 76		
					MATERIAL SEE NOTE 1		
					DRAWING NO		
					ESP- A64		

# NOTES:

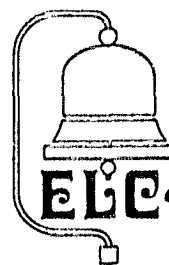
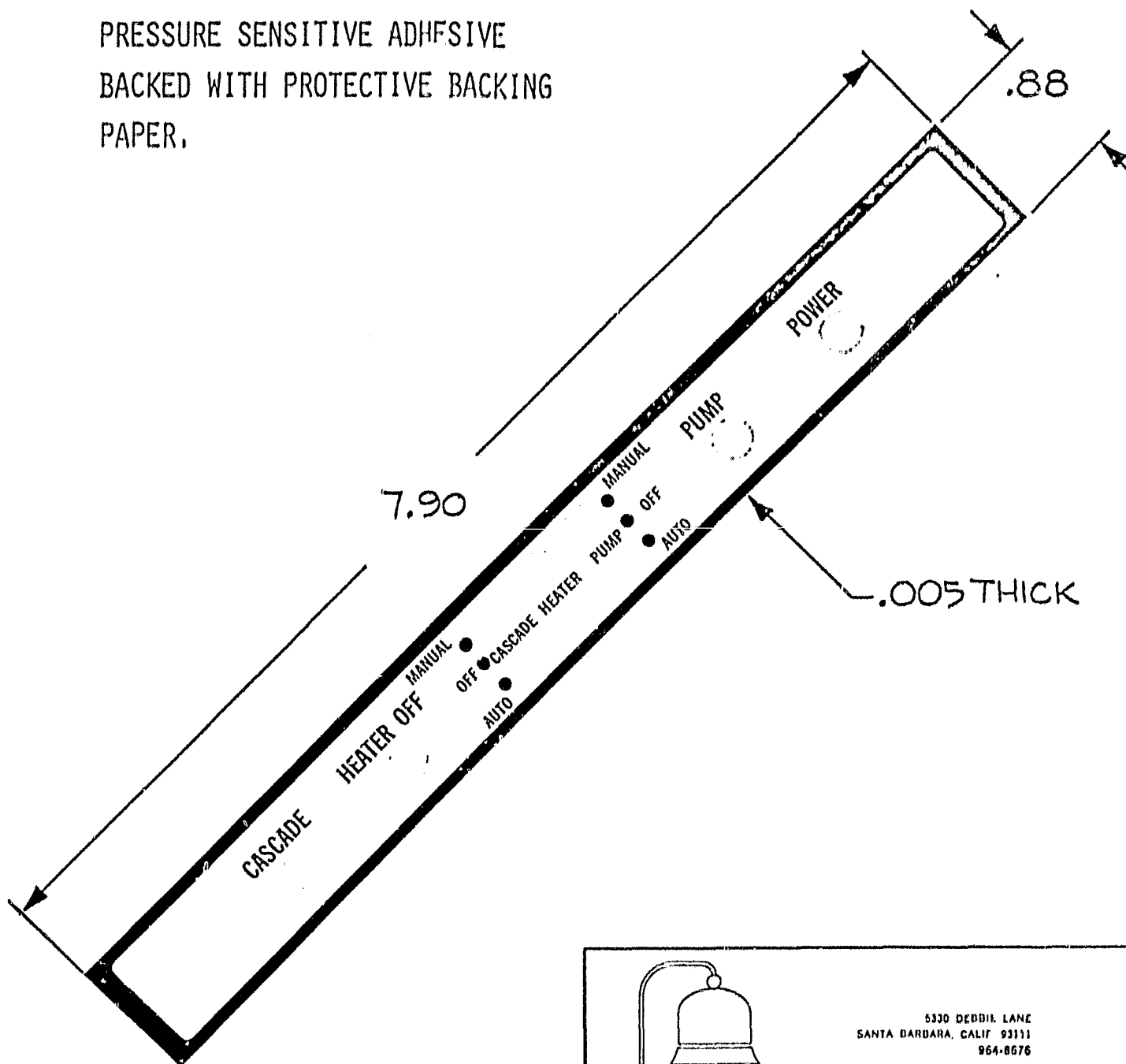
## 1. MATERIAL:

PHOTOGRAPHIC PAPER

PRESSURE SENSITIVE ADHESIVE

BACKED WITH PROTECTIVE BACKING

PAPER,



5330 OGDEN LANE  
SANTA BARBARA, CALIF 93111  
964-8676

**ELEM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 65		
XX ± .00		1			PART NAME		
XXX ± .00		2			LABEL, CONTROL		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	FULL	SEE NOTE 1
		5			DATE	5 DEC 76	DRAWING NO
					TRACED	APP D	ESP-A65



# NOTES:

## 1. MATERIAL:

LOW CARBON STEEL

COLD ROLLED COMMERCIAL

QUALITY NO. 1, FULL HARD TEMPER

## 2. PROTECTIVE FINISH:

CADMIUM PLATE.

ZINC CHROMATE OPTIONAL.

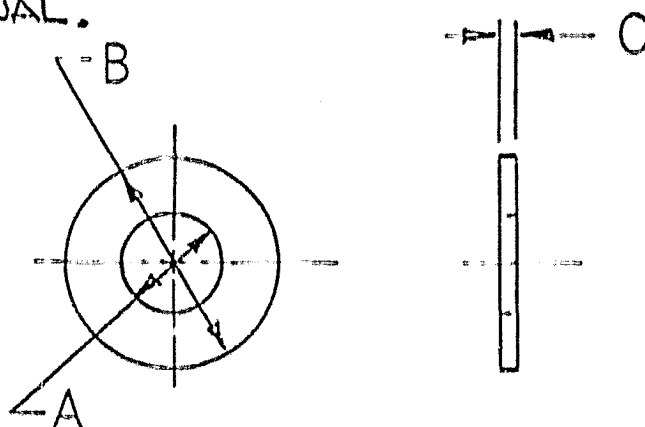


TABLE I

PART NO.	SCR SIZE	A	B	C
AP66-001	4	.120-.125	.245-.250	.017-.028
AP66-002	6	.151-.164	.307-.320	.027-.048
AP66-003	8	.183-.196	.370-.390	.036-.065



5330 DIEDIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELCAM, INC.**

Contractors License No. 290299

<b>TOLERANCES</b> UNLESS OTHERWISE SPECIFIED DECIMAL XX ± .00 — XXX ± .00 — ANGULAR ± DRAFT	<b>REVISIONS</b>			<b>PART NUMBER</b> AP66	
	NO	DATE	BY	<b>PART NAME</b> WASHER, FLAT	
	1			<b>DRAWN BY</b> THOMPSON	
	2			<b>SCALE</b> NONE <b>DATE</b> 14 DEC 74 <b>APP'D</b>	
106	3			<b>NOTED</b> NOTE 1 <b>DRAWING NO</b> ESP-A66	
	4				
	5				

# NOTES:

## 1. MATERIAL:

STEEL, CARBON  
C1060 TO C1080  
ROCKWELL "C" 45-53.

## 2. PROTECTIVE FINISH:

CADMIUM PLATE.

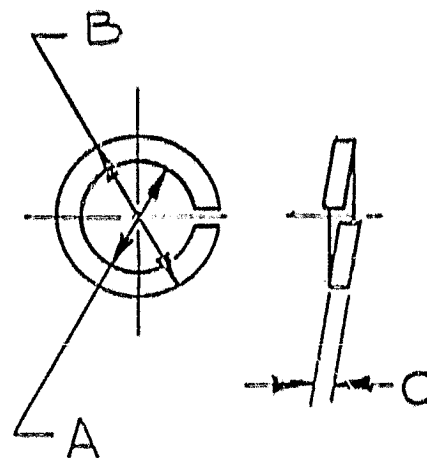
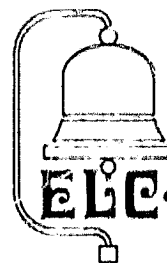


TABLE I

PART NO.	SCR SIZE	A	B	C
AP67-001	4	.115-.121	.209 MAX	.025 MIN
AP67-002	6	.141-.148	.250 MAX	.031 MIN
AP67-003	8	.168-.175	.293 MAX	.040 MIN



5330 DEBBIE LANE  
SANTA BARBARA CALIF 93111  
954-8676

**ELCAM, INC.**

Contractor's License No. 293399

TOLERANCES	REVISIONS			PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL XX ± .00 XXX ± .00 ANGULAR ± DRAFT	NO	DATE	BY	AP67
	1			PART NAME
	2			WASHER, LOCK SPRING
	3			DRAWN BY
	4			THOMSON
	5			SCALE
				NONE
				DATE
				15 DEC 76
				APP'D
				TRACED
				MATERIAL
				NOTE 1
				DRAWING NO
				ESP-A67

LEAD ITEM	WIRE MATL ITEM	LEAD LGTH	CIRCUIT POINT FROM (A) TO (B)	TERM AREA NO	JACK STRIP LGTH	SHLD STRIP LGTH	LEAD CUT LGTH	INSUL STRIP LGTH	TIN	NOTE ONE FIG	ACCESSORY ITEMS
J1	1	1.0									
J2	1	1.0									
J3	2	1.4						.20 .20			
J4	1	.7									
J5	1	.8									
J6	1	.8									
J7	2	1.3						.20 .20			
J8	1	.7									
J9	1	1.0									
J10	1	.7									
J11	1	.7									
J12	1	.7									
J13	1	.7									

SHEET TOP 2

# NOTES:

1. AWG 24 SOLID COPPER WIRE  
TYPES S, SOFT, LEAD ALLOY  
COATED.
2. AWG 24 HOOK-UP WIRE  
TEFLON INSUL., COLOR WHT,  
SOLID WIRE
3. AWG 18 HOOK-UP  
WIRE, TEFLON INSUL,  
COLOR BLACK,  
STRANDED WIRE.

NOTES CONT ON SH 2



6310 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELEC-M, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	AP68	
XX + .00 -		1		PART NAME	
XXX + .00 -		2		LEAD SET	
ANGULAR +		3		THOMPSON	
DRAFT		4		SCALE NONE	
TOL:		5		DATE 14-DEC 76	
X ± .06		6		APP'D	
				SEE NOTES	
				DRAWING NO	
				ESP-A68	

LEAD ITEM	WIRE MATL ITEM	LEAD LGTH	CIRCUIT POINT FROM (A) TO (B)	TERM AREA NO	JACK STRIP LGTH	SHLD STRIP LGTH	LEAD CUT LGTH	INSUL STRIP LGTH	TIN	NOTE ONE FIG	ACCESSORY ITEMS
J14	1	.7									
J15	3	6.8						.20			
								.20			
J16	4	6.8						.20			
								.20			
J17	4	5.3						.20			
								.38			
J18	3	8.5						.38			
								.20			
J19	3	6.6						.20			
								.38			
J20	3	3.6						.38			
								.38			
J21	1	.7									
J22	2	2.3						.20			
								.20			

SHEET 2

NOTES:(CONTINUED)

4. AWG 18 HOOK-UP WIRE  
TEFLON INSUL, COLOR WHT,  
STRANDED WIRE

5. SOLDER USING 60/40  
SOLDER



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP68		
.XX ± .00		1			PART NAME		
.XXX ± .00		2			-		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			CHK'D	DATE	DRAWING NO
		5			TRACED	APP'D	ESP-A68

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OF POOR QUALITY

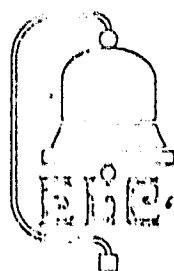
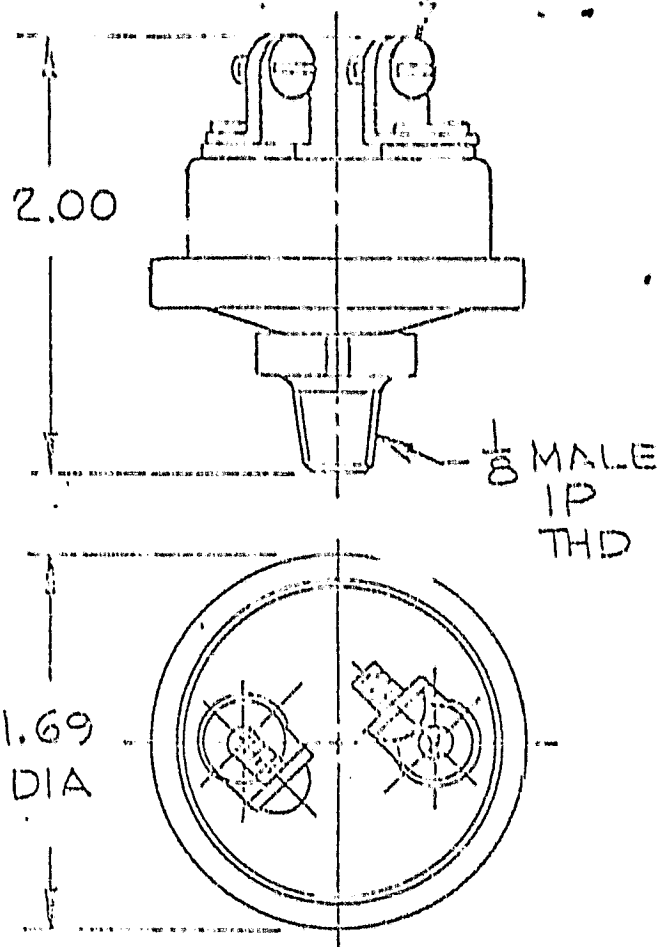
# PROJES:

1. SWITCH, LOW PRESSURE  
NORMALLY CLOSED  
SINGLE CIRCUIT  
4 PSI - 150 PSI OPER MAX  
PART NO. M-4007

2. SUGGESTED SOURCE(S)  
OF SUPPLY:

STEWART-WARNER CORP.  
HOBBS DIVISION  
FSCM NO. 74400

2 TERMINALS  
INSULATED  
.164-32 THD



5310 DI BLUE LANE  
SANTA BARBARA, CALIF 93111  
954-8670

**ELEM, INC.**

Contractors License No. 290395

TOLERANCES		REVISIONS		PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY
XX ± .00	—	1		
XXX ± .00	—	2		
ANGULAR ±	—	3		
DRAFT		4		
		5		
		6		
		7		
		8		
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		99		
		100		

Figure 2.1.2

# NOTES:

1. VALVE, GENERAL PURPOSE

THREE-WAY NORMALLY OPEN

OPER PRESS DIFFERENTIAL:

150 PSI MAX.

10 PSI MIN

PART NO. LP8RBMX37.

24 VDC VOLTAGE

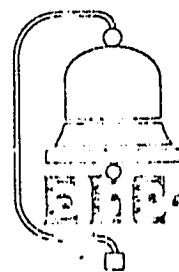
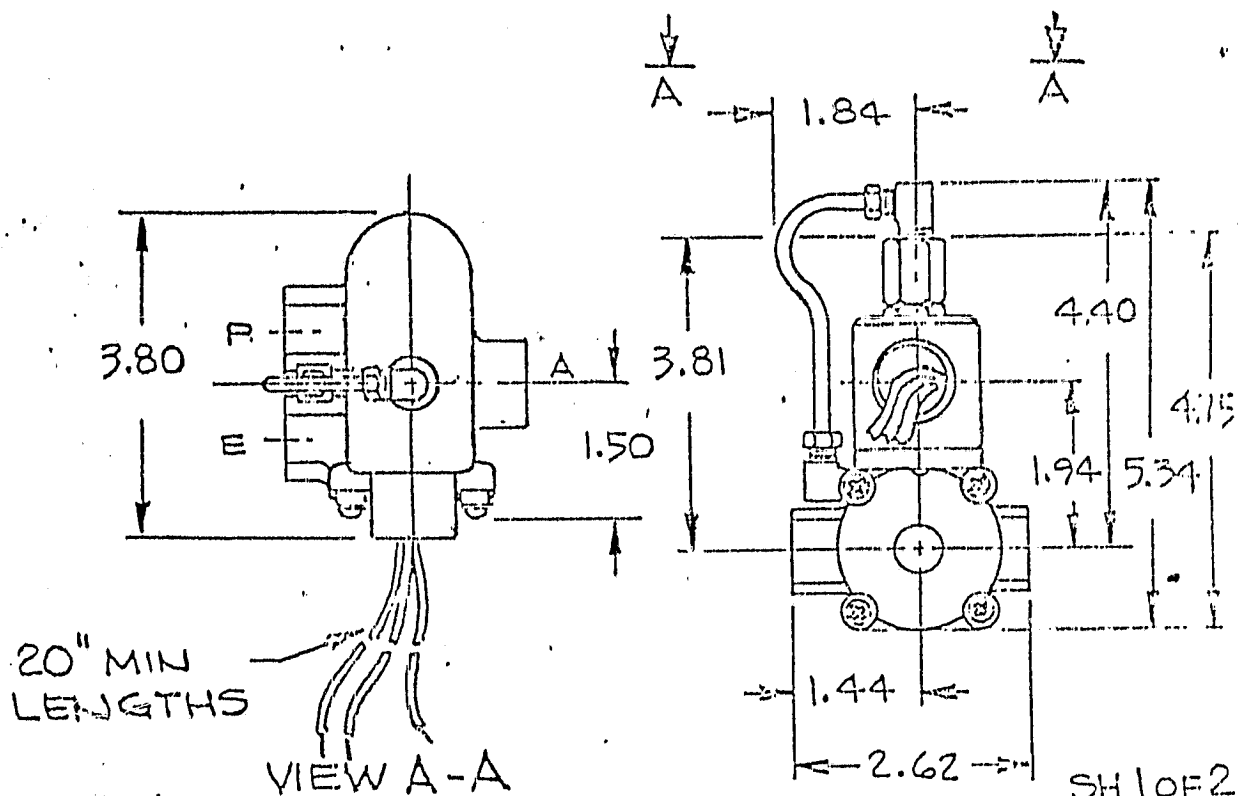
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OF POOR QUALITY

2. SUGGESTED SOURCE(S)

OF SUPPLY:

SKINNER PRECISION INDUSTRIES INC.

FSCM NO. 55130



5330 DERRIE LANE  
SANTA BARBARA, CALIF. 93111  
904-8676

**ELEM, INC.**

Contractors License No. 290399

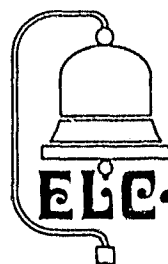
Figure 2.1.1

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	AP 72	
XX ± 0.0		1			PART NAME	
XXX ± 0.0		2			VALVE, THREE-WAY	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
VENDOR'S		5			DATE	
TOLER		6			11 MAY 72	
APPLY		7			APPROVED	
		8			ESP-A72	

### 1. MATERIAL:

## 2. PROTECTIVE FINISH:

ZINC PLATE  
.0002 MIN THICKNESS  
CLEAR CHROMATE  
SPEC QQ-Z-325



# ELCAM, INC.

Contractors License No. 290399

TOLERANCES		REVISONS		PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	TP2
.XX ± 0.0		1			PART NAME
.XXX ± 0.0		2			RESTRAINT PLATE, SENSOR
ANGULAR ±		3			DRAWN BY
DRAFT		4			THOMSON
		5			CHK D
					SCALE
					FULL
					MATERIAL
					SEE NOTE 1
					DRAWING NO
					ESP-T2
					DATE
					6 DEC 76
					APP D
					TRACED

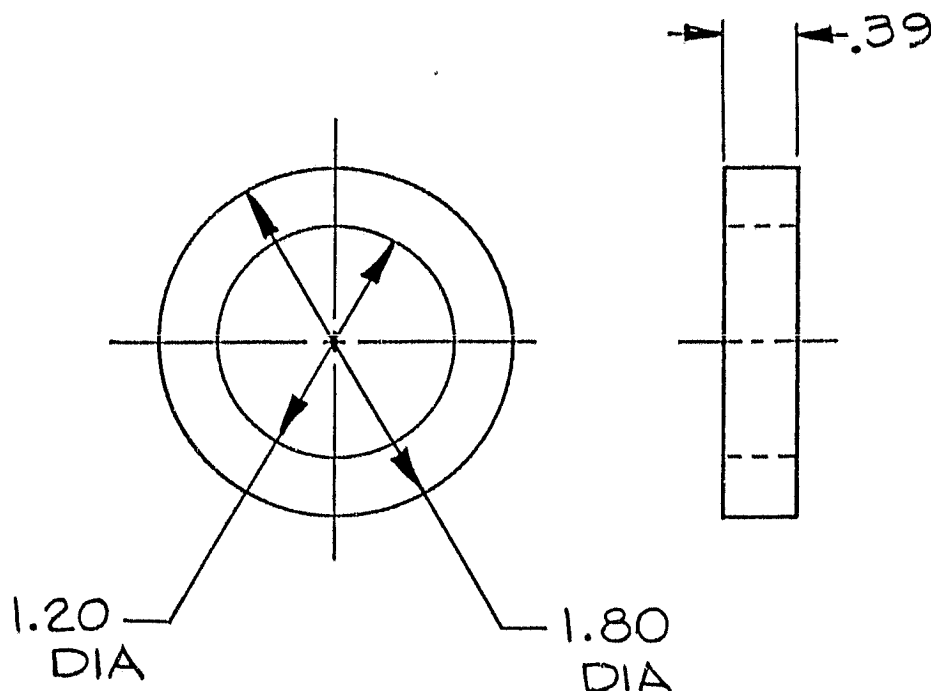
# NOTES:

## 1. MATERIAL:

RUBBER, BUNA N  
DUROMETER 55-65  
(FIRM)  
COLOR BLACK

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

AO SMITH CORP  
FSCM 28611  
PART NO. 37819  
OR EQUIV



5330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	TP5	
XX ± 00 =		1			PART NAME	
XXX ± 00 =		2			GASKET	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
VENDORS		5			SCALE	
TOL APPLY					FULL	
					DATE	
					6 DEC 76	
					MATERIAL	
					SEE NOTE 1	
					DRAWING NO	
					ESP-T5	



NOTES:

1. MATERIAL:  
ALUMINUM ALLOY EXTRUSION  
CMP5N 6063 TEMPER T5  
DIE SECTION 66876

2. VENDOR:  
REYNOLDS METALS CO.  
FSCM NO. 09983

3. PROTECTIVE FINISH:  
NONE

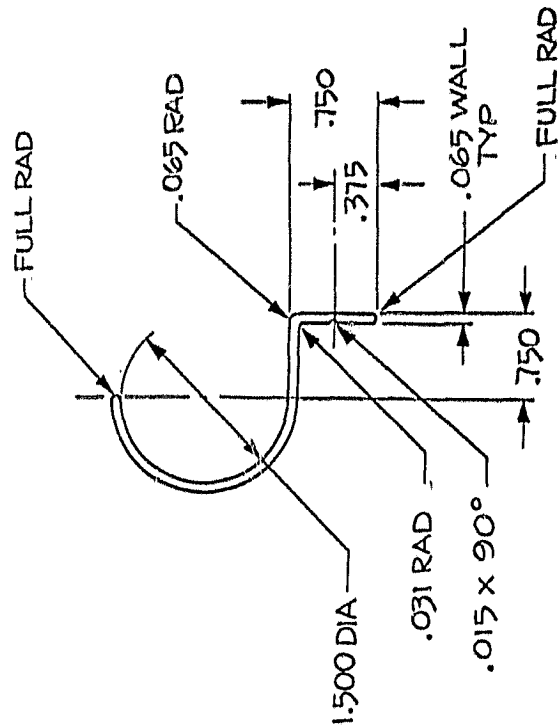


TABLE I

PART NO.	LENGTH	REMARKS
I1-001	CU <sup>T</sup> 1.74-1.75	
I1-002	AS SUPPLIED	



ELCAM, INC.  
10000 W. 10TH AVE.  
DENVER, CO. 80231

ELCAM, INC.

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REVISIONS	REVISED	DATE	BY
1			
PART NAME			
PIPE HANGER			
PART NUMBER			
I1			
VENDOR			
REYNOLDS METALS CO.			
DIE SECTION			
66876			
FINISH			
NONE			
ESI-1			

# NOTES:

## 1. MATERIAL:

BRASS SOLDER-JOINT

SWING CHECK VALVE-TEFLON SEAT

WORKING PRESS. 125 LBS

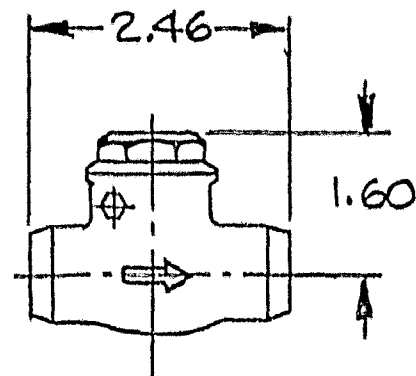
TEMP. 200° F MIN

## 2. SUGGESTED SOURCE(S)

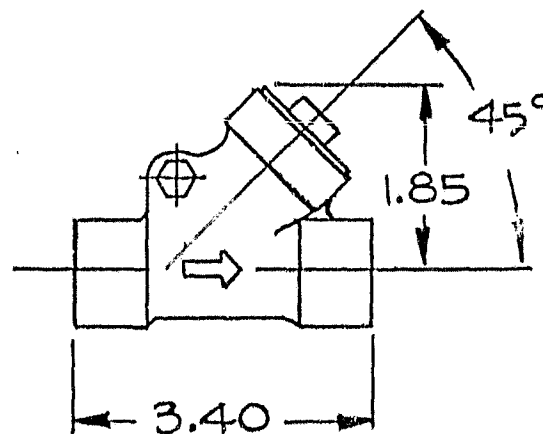
OF SUPPLY:

CRANE CO.

FSCM NO. 14959



STYLE 1



STYLE 2

TABLE I

PART NO.	STYLE	SIZE
I2-001	1	1/2
I2-002	2	3/4



5330 DERRIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

TOLERANCES		REVISIONS			PART NUMBER	
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	I 2	
.XX ± 0.0 —		1			PART NAME	
.XXX ± 0.0 —		2			CHECK VALVE	
ANGULAR ±		3			DRAWN BY	
DRAFT		4			THOMSON	
VENDOR'S TOL		5	115		SCALE	
APPLY					NONE	
					DATE	
					15 DEC 76	
					MATERIAL	
					SEE NOTE 1	
					DRAWING NO	
					ESI - 2	

# NOTES:

## 1. MATERIAL:

PRESSURE & TEMPERATURE  
RELIEF VALVE.

AUTOMATIC-RESEATING  
COMBINATION TYPE,  
BRASS CONSTRUCTION

NO. 100 XL

PSI SET 150 LBS

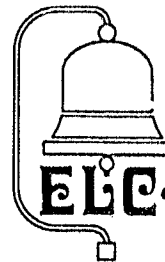
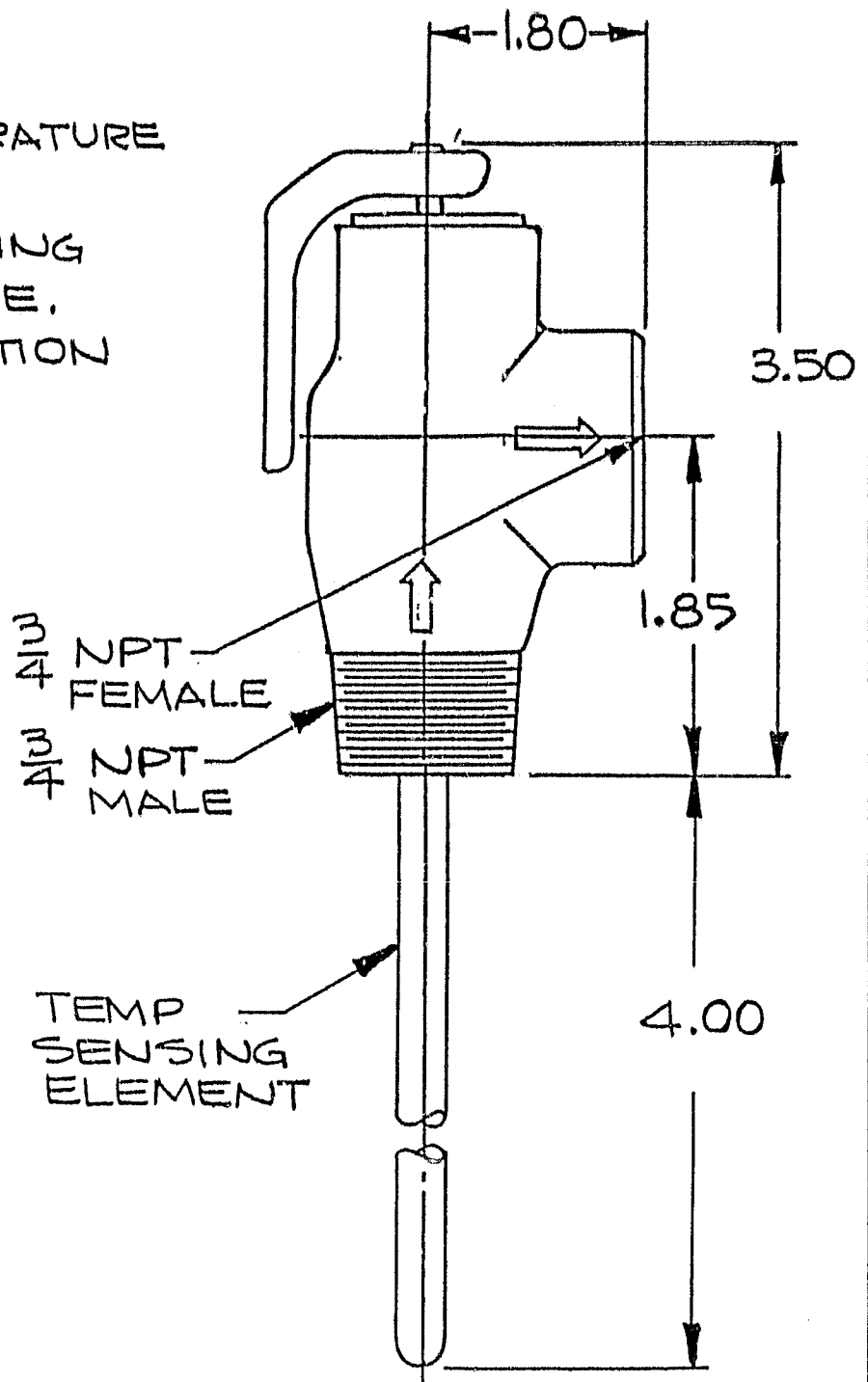
TEMP SET 210°F

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

WATTS

REGULATOR CO.

FSCM NO. 79227



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS		PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY
.XX ± 0.0		1		
.XXX ± 0.0		2		
ANGULAR ±		3		
DRAFT		4		
VENDOR'S		5	116	
TOL. APPLY				
				PART NAME
				<b>PRESS &amp; TEMP VALVE</b>
DRAWN BY		SCALE		MATERIAL
THOMSON		FULL		SEE NOTE 1
CHK'D		DATE		DRAWING NO
		15 DEC 76		
TRACED		APP'D		ESI-3

# NOTES:

## 1. MATERIAL:

BRASS SOLDER JOINT

GATE VALVE

NON-RISING STEM

SOLID WEDGE

WORKING PRESS, 125 LBS

TEMP. 200°F MIN

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

CRANE CO.

FSCM NO. 14959

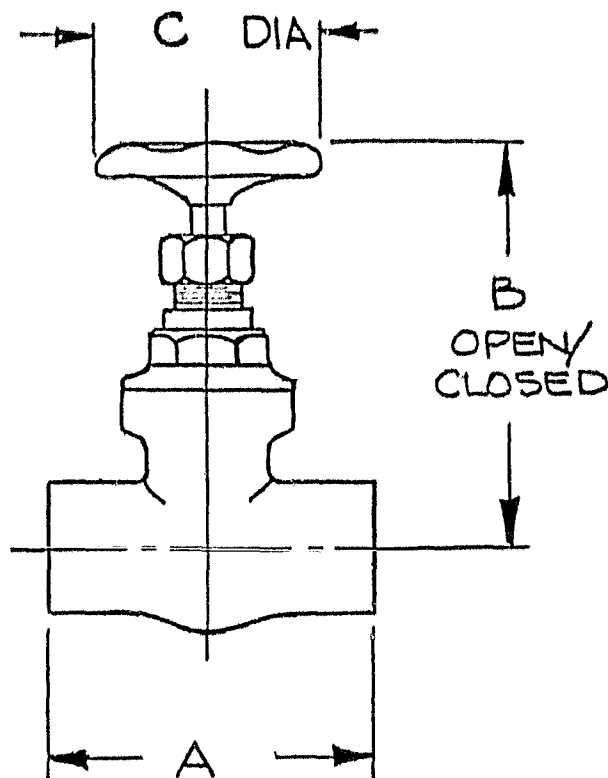


TABLE I

PART NO.	A	B	C	SIZE
I5-001	1.85	3.20	1.88	1/2
I5-002	2.50	3.40	2.16	3/4



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	I5		
.XX ± 0.0		1			GATE VALVE		
.XXX ± 0.0		2			DRAWN BY THOMPSON		
ANGULAR ±		3			SCALE NONE		
DRAFT		4			MATERIAL SEE NOTE 1		
VENDORS		5	117		15 DEC 76		
TOL APPLY					APP'D		
					ESI-5		

# NOTES:

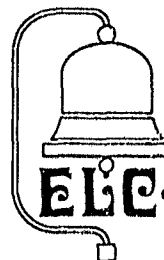
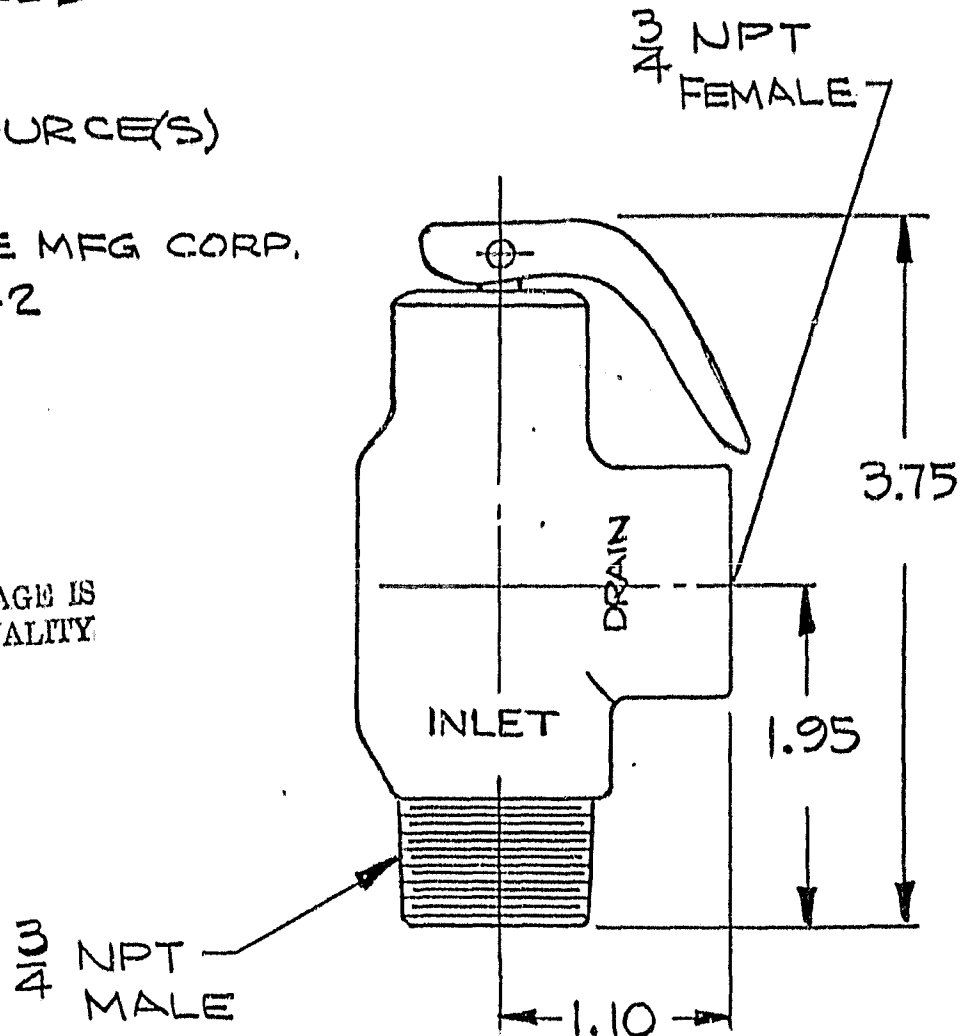
## 1. MATERIAL:

PRESSURE RELIEF VALVE  
WITH TEST LEVER  
BRASS CONSTRUCTION  
TYPE FWL-2  
PSI SET 150 LBS

## 2. SUGGESTED SOURCE(S) OF SUPPLY:

CASH A.W. VALVE MFG CORP.  
FSCM NO. 71342

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5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
964-8676

**ELCAM, INC.**

Contractors License No 290399

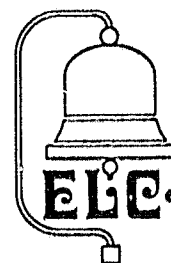
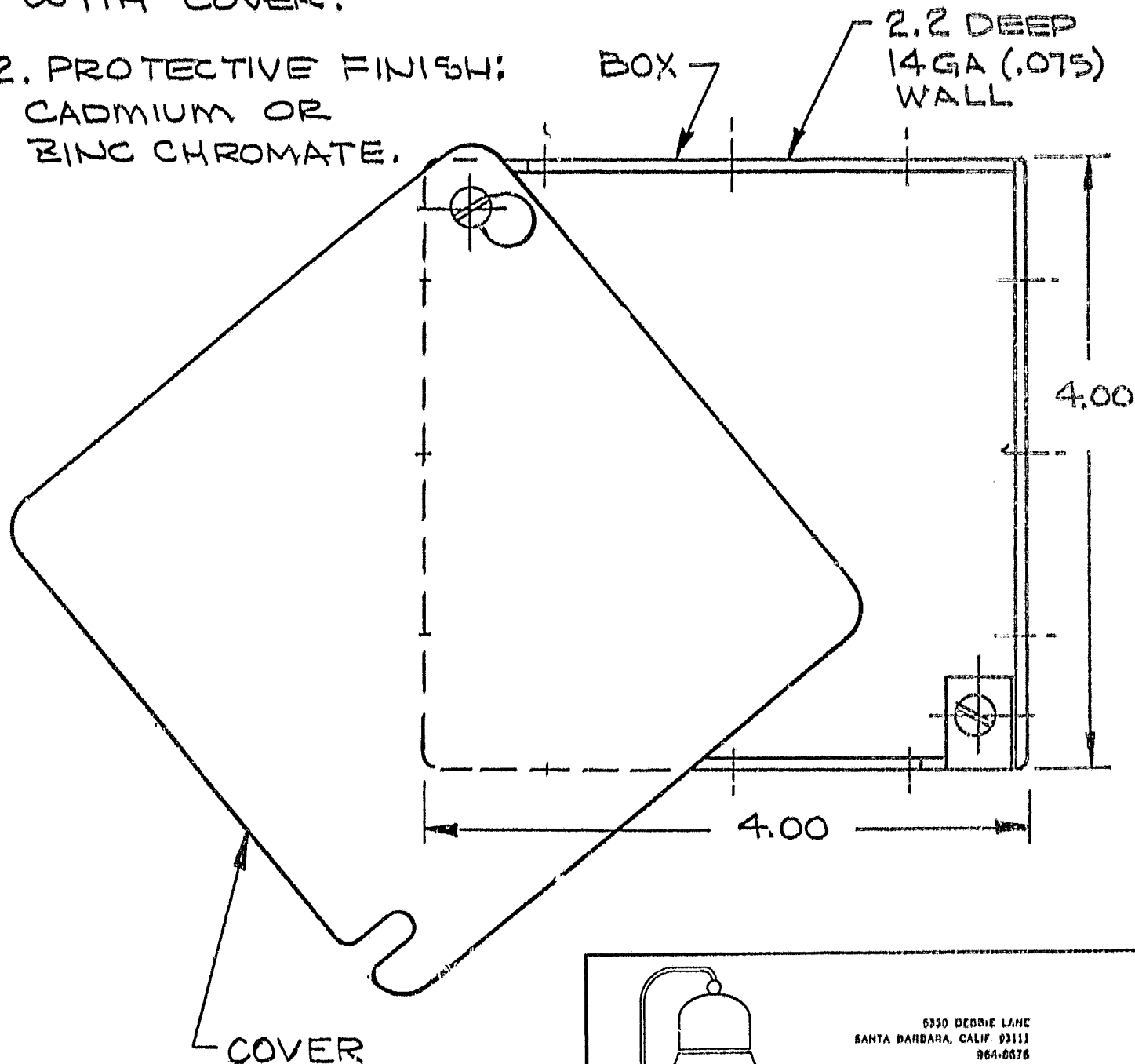
TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	I 6		
.XX ± 0.0		1			PART NAME		
.XXX ± 0.0		2			PRESSURE RELIEF VALVE		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
VENDOR'S		5			CHK'D		
TOL					TRACED		
APPLY			118		SCALE FULL		
					DATE 15 DEC 76		
					DRAWING NO		
					ESI -6		

NOTES:

1. MATERIAL:

CARBON STEEL STANDARD  
ELECTRICAL JUNCTION BOX  
WITH COVER.

2. PROTECTIVE FINISH:  
CADMIUM OR  
ZINC CHROMATE.



6330 DEBBIE LANE  
SANTA BARBARA, CALIF 93111  
864-0876

**ELCAM, INC.**

Contractors License No. 29039

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	I7		
.XX ± 0.0		1			PART NAME		
.XXX ± 0.0		2					
ANGULAR ±		3			HOUSING		
DRAFT		4					
VENDOR'S TOL APPLY		5	119		DRAWN BY THOMSON	SCALE FULL	MATERIAL SEE NOTE 1
					CHK D	DATE 16 DEC 76	DRAWING NO
					TRACED	APP D	EST-7

# NOTES:

## 1. MATERIAL:

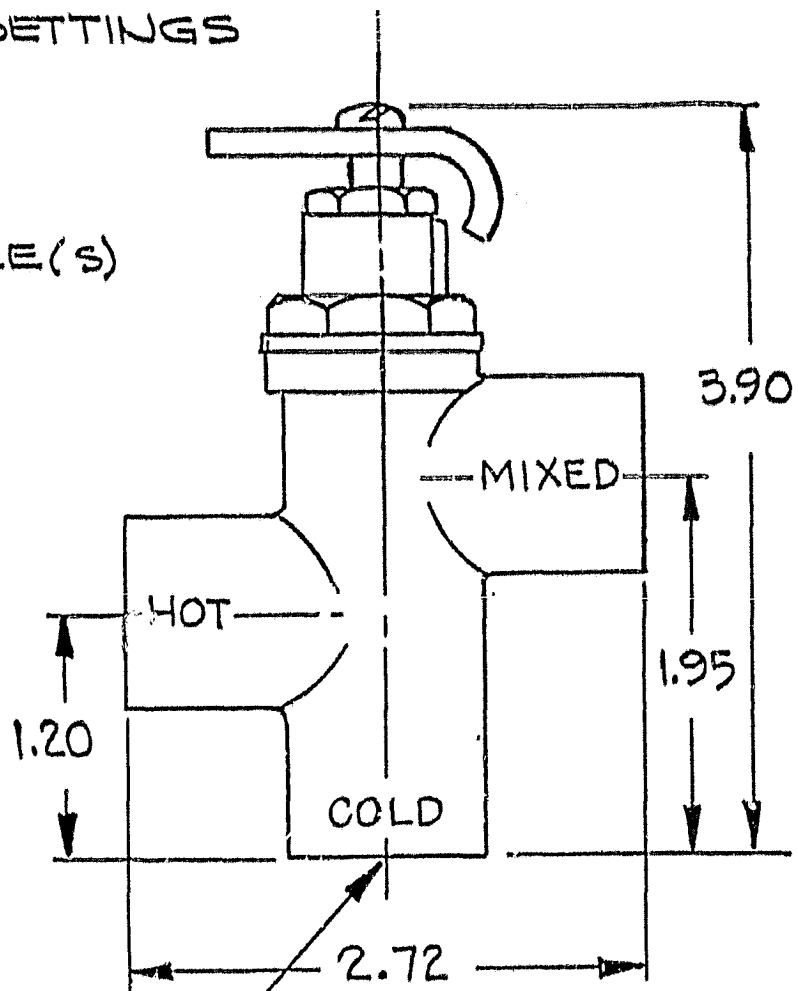
BRASS SOLDER JOINT  
TEMPERING VALVE WITH  
EXTERNAL ADJUSTMENT  
120° - 140° - 160° F SETTINGS  
NO. 526

## 2. SUGGESTED SOURCE(S)

OF SUPPLY:

TACO INC.

FSCM NO. 59015



3/4 SOLDER  
JOINT  
3 PLACES



8330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

**ELCAM, INC.**

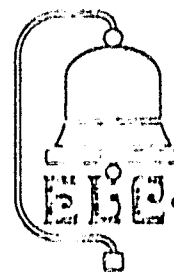
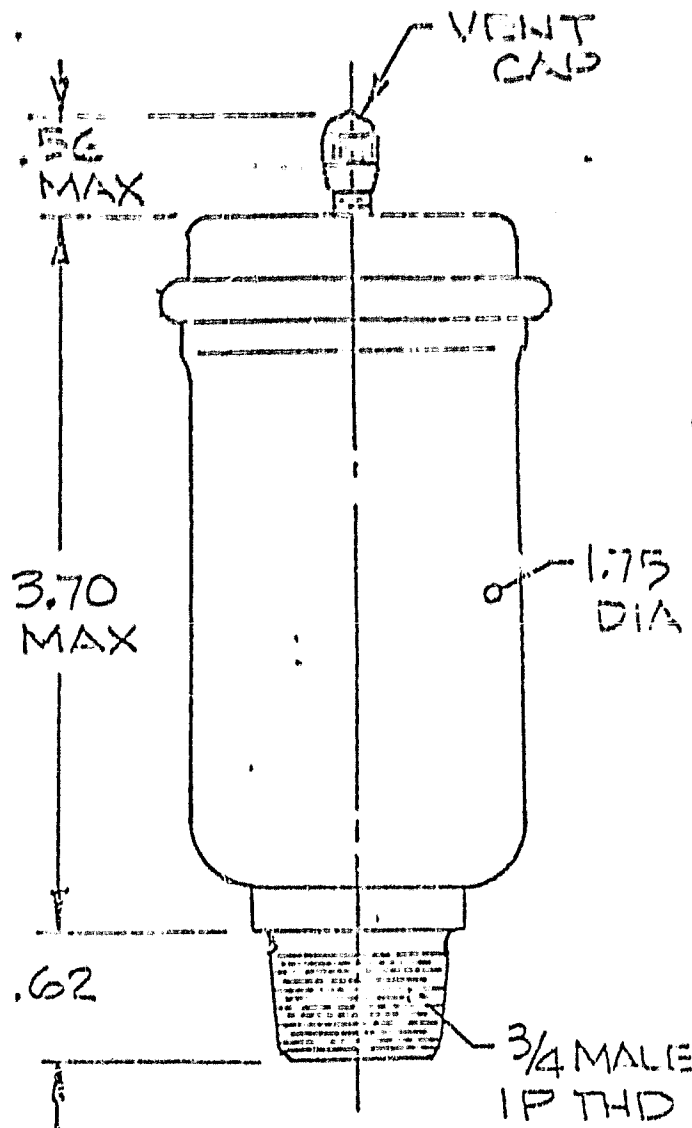
Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	I12		
.XX ± .04		1			PART NAME <b>TEMPERING VALVE</b>		
.XXX ± .00		2					
ANGULAR ±		3			DRAWN BY <b>THOMSON</b>		
DRAFT		4					
VENDOR'S		5	120		SCALE <b>FULL</b>		
TO APPLY					DATE <b>16 DEC 76</b>		
					MATERIAL <b>SEE NOTE 1</b>		
					DRAWING NO. <b>ESI-12</b>		

1. VALVE, VENT, AIR  
 BRASS  
 FLOAT TYPE  
 MAX WORKING PRESS 150 PSI

2. PART NO. 87

3. SUGGESTED SOURCE(S)  
 OF SUPPLY:  
 ITT-BELL & GOSSETT DIV  
 FSCM 06631



5330 DELRUE LANE  
 SANTA BARBARA, CALIF. 93111  
 804 8676

**ELEM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS		PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	I-14
XX ± .00		1		
XXX ± .00		2		
ANGULAR ±		3		
DRAFT		4		
VENJON'S		5		PART NAME
TOLER				VENT VALVE, AIR
APPLY				THOMAS
				DATE NOV 77
				ES1-14
		121		

Figure 2.1.5

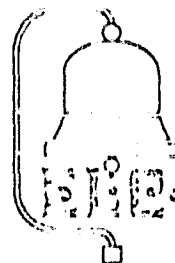
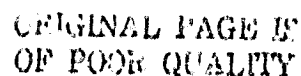


1. VALVE, CHECK.

OPER. TEMP. -10° TO 250°F.  
CRACKING PRESS. 1 PSI NOM.

### 3. SUGGESTED SOURCE(S) OF SUPPLY:

CIRCLE SIGNAL CORP  
FSCM NO. 274-09



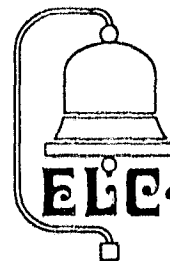
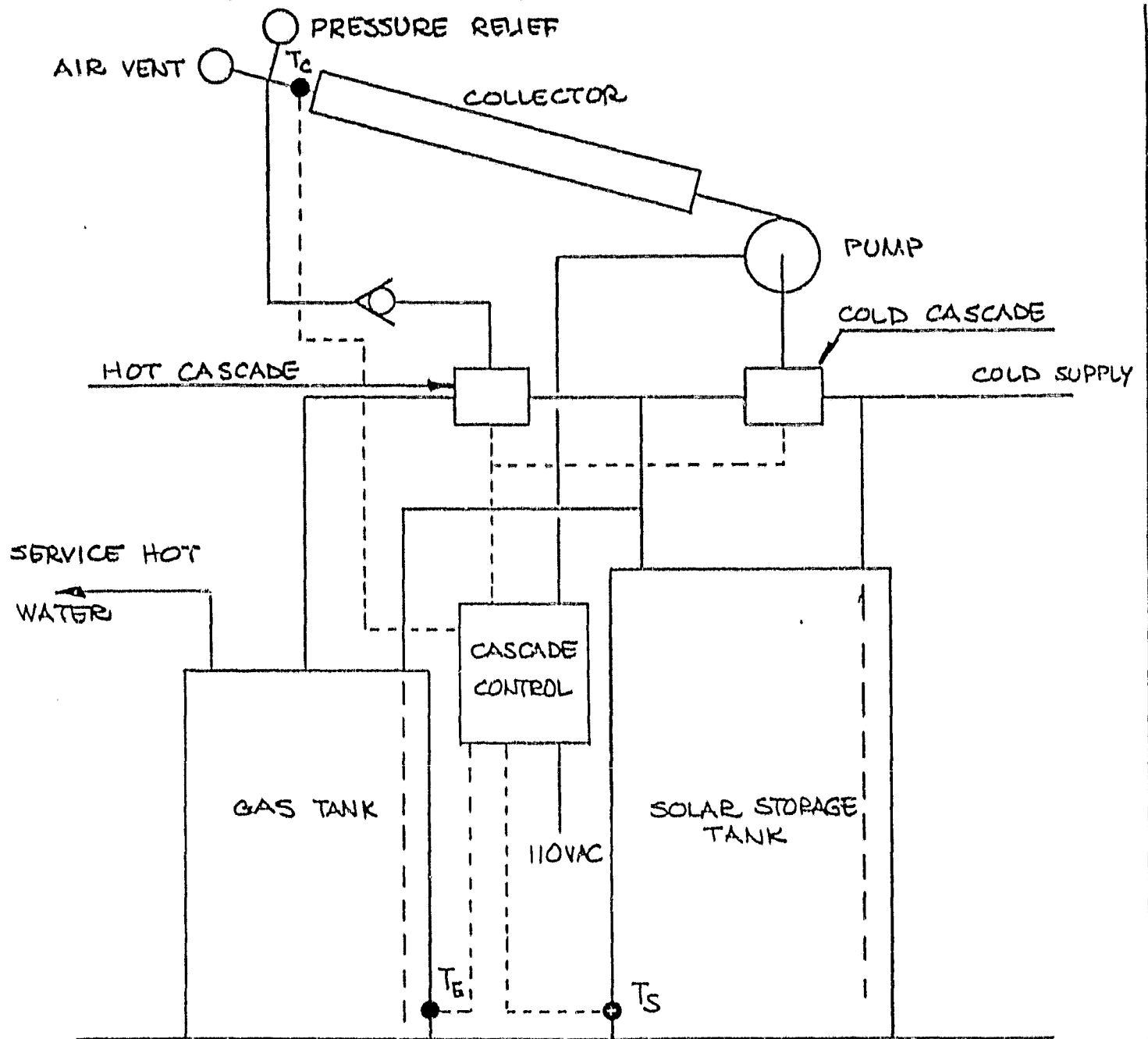
9330 CINDIE LANE  
SANTA BARBARA, CALIF 93111  
964 8676

12121M. IN2.

Collector's License No. 245140

[illegible]

Figure 2.1.4



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL XX ± 0.0 XXX ± 0.0 ANGULAR ± DRAFT		NO	DATE	BY	PART NAME		
		1			GAS CASCADE SCHEMATIC		
		2					
		3			DRAWN BY	TCH	SCALE
		4			CHECKED		DATE
		5	123		TRACED		APP'D
					DRAWING NO		
					ESS-8		

# NOTES:

## 1. MATERIAL:

GLASS-LINED  
WATER HEATER  
MODEL, SEE TABLE I

## 2. VENDOR:

AO SMITH CORP  
FSCM NO. 28611

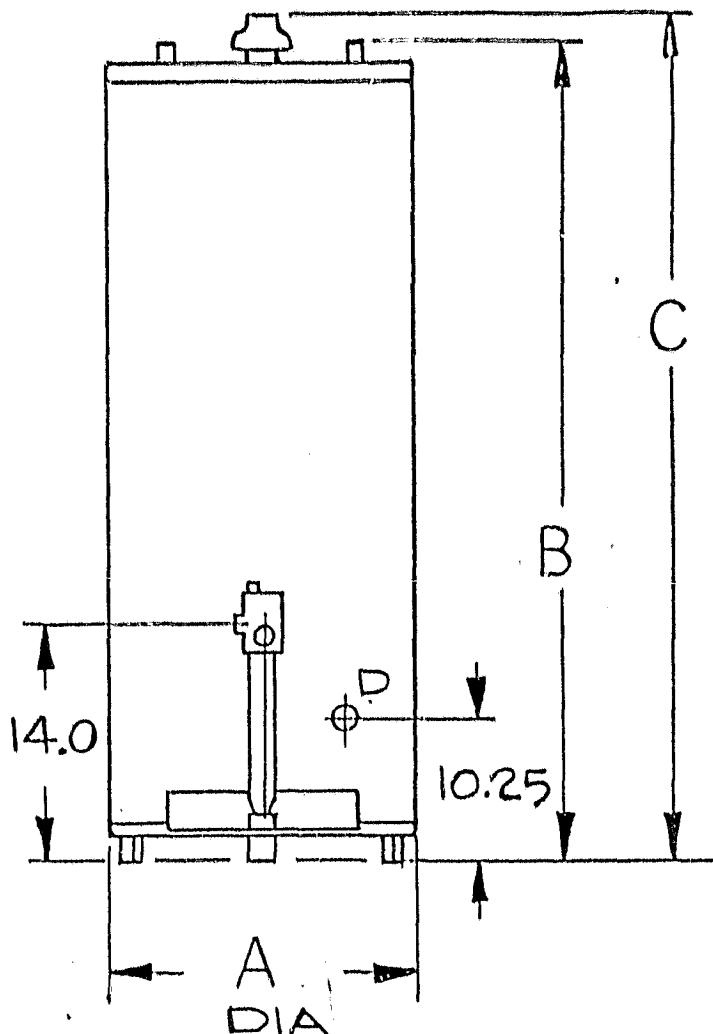
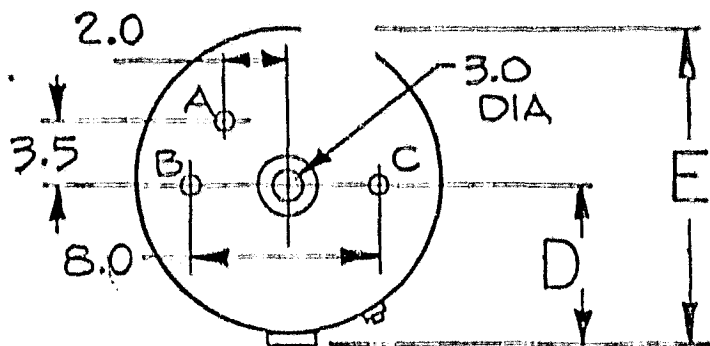
TABLE I

SPECS	-001	-002	-003	-004
MODEL	PGC-40 NAT	PGC-40 L.P.	PGC-50 NAT	PGC-50 L.P.
CAP IN GALS	40	40	50	50
INPUT BTU/HR	32,500	37,000	44,000	40,000
REC GPM 100° RISE	29.3	31.1	39.6	33.6
SHIP WT/LBS	129	138	166	166
Dim A	18.25	18.25	20.25	20.25
B	55.12	54.50	59	59
C	57.62	61.62	65.5	65.5
D	10.62	10.62	11.62	11.62
E	21.75	21.75	23.75	23.75

## CODE

A = RELIEF VALVE  
OPENING 3/4 NPT  
B = OUTLET 3/4 NPT  
C = INLET 3/4 NPT  
D = DRAIN VALVE

NOTE: PART NO. MUST  
INCL DASH NO.  
ie: E4-001



6330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
954-8676

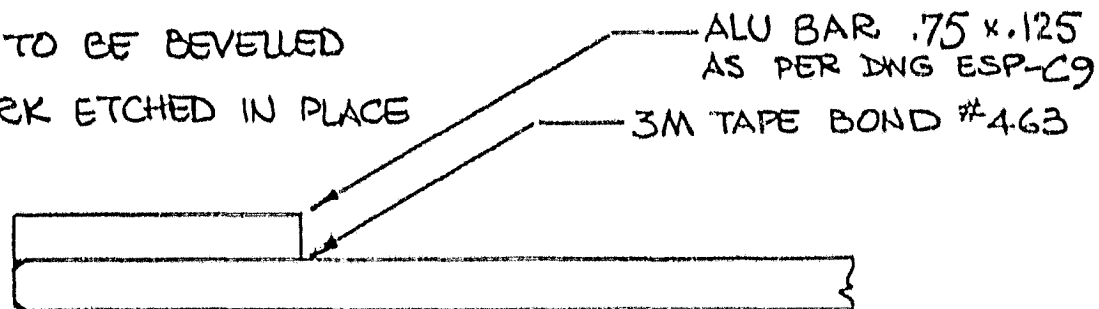
**ELCAM, INC.**

Contractors License No. 290399

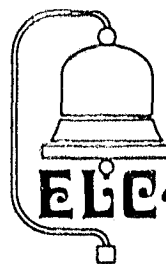
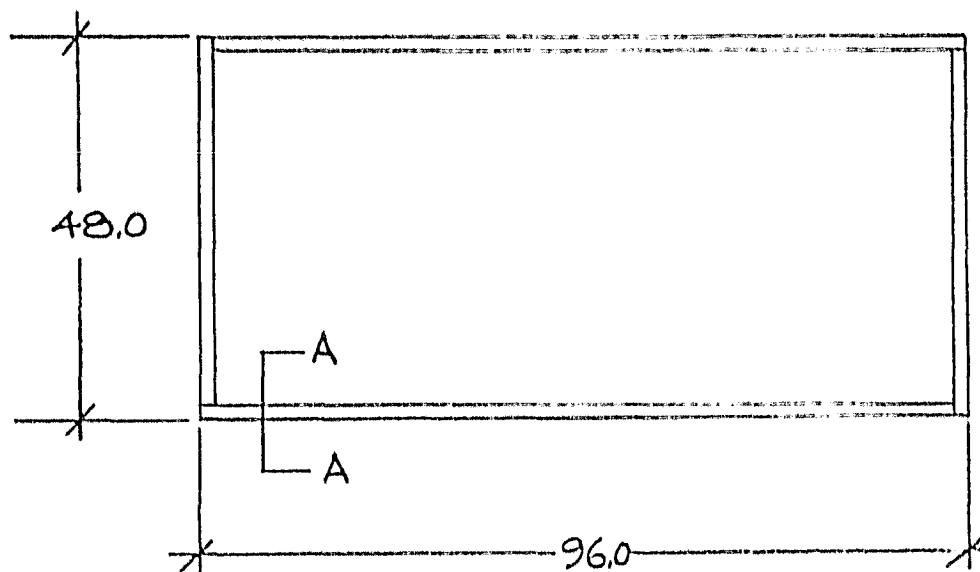
TOLERANCES	REVISIONS			PART NUMBER
UNLESS OTHERWISE SPECIFIED DECIMAL	NO	DATE	BY	E4
XX ± 00	1			PART NAME
XXX ± 00	2			GAS TANK
ANGULAR ±	3			DRAWN BY
DRAFT	4			THOMSON
VENDOR'S	5			SCALE NONE
TOL APPLY	124			DATE 29 NOV 76
				MATERIAL SEE NOTE 1
				DRAWING NO
				ESE-4

# NOTES :

1. GLASS : 1/8" TEMPERED
2. ALL EDGES TO BE BEVELLED
3. SAFETY MARK ETCHED IN PLACE



SECTION AA SCALE 2:1

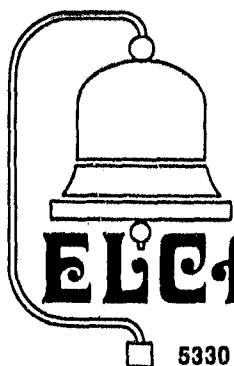


5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964-8676

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL XX ± .00 .XXX ± .00 ANGULAR ± DRAFT		NO	DATE	BY	CP-21		
		1			PART NAME		
		2			GLASS COVER ASSY.		
		3			DRAWN BY	TCH	SCALE —
		4			CHK'D	DATE	3-10-78
		5	125		TRACED	APP'D	
					MATERIAL NOTED		
					DRAWING NO		
					ESP-C21		



EL CAMINO POOLS 964-6929  
EL CAMINO SOLAR SYSTEMS 964-8676

# EL CAM, INC.

5330 DEBBIE LN., SANTA BARBARA, CALIFORNIA 93111

November 19, 1976

NASA  
Marshall Space Flight Center  
Alabama 35812

Attention: Mr. Mitchell Cash

Dear Mitch:

We hereby transmit the documents required for review prior to PDR1, according to Contract NAS8-32245, TD2 and TD3. Executed originals and two copies of TD2 and TD3 are being mailed to you under separate cover.

For your information we have also included three copies of our collector data sheet which has just come off the press.

We look forward to your comments and review.

Yours truly,

  
Terence C. Horikman  
Vice President

Enclosures: 10 copies, ESC-2, Verification Plan  
10 copies, ESC-7a, Drawing List  
10 copies, ESC-7b, Suggested Prototype Design Review Data  
2 copies, 1 reproducible, ESC-7c System Drawings  
10 copies, ESC-7d, Autocontrol Logic  
10 copies, ESC-7e, Measurement Definitions (Mini-P.I.P.)  
10 copies, ESC-7f, Proposed Modifications to SUNSPOT CASCADE  
10 copies, ESC-7g, List of Materials in Contact with Potable Water  
10 copies, ESC-15, Special Handling, Installation & Maintenance  
Tools List  
10 copies, ESC-18 Hazards Analysis

Distribution, except for drawings, as follows:  
1 copy to Contracting Officer/AP32  
2 copies to Technical Manager/FA32  
7 copies to SH&C Change Integration/FA02B

ORIGINAL PAGE 1  
OF FOUR QUALITY

NOTES:

1. MATERIAL:

VINYL PLASTIC

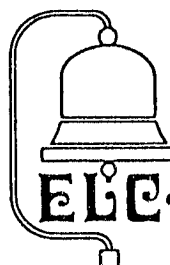
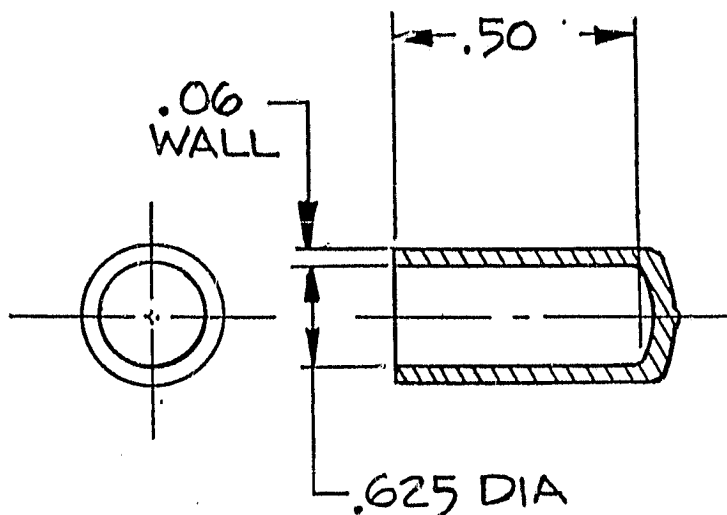
COLOR RED

2. VENDOR:

SINCLAIR & RUSH INC.

FSCM NO

PART NO. 625-8



8330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

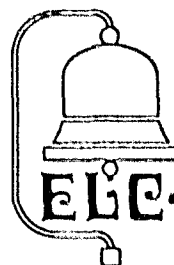
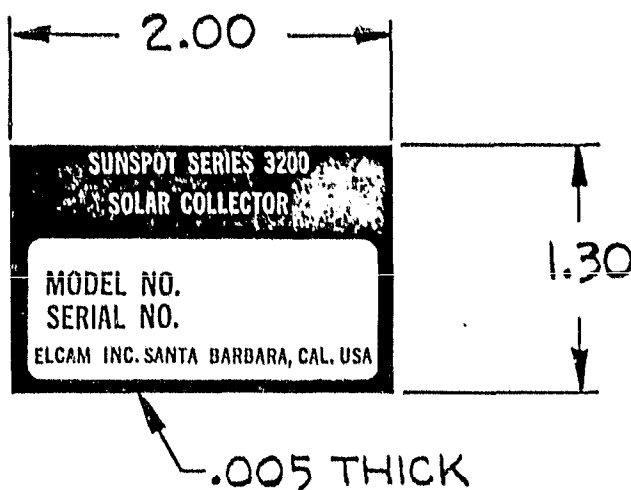
Contractors License No. 290399

TOLERANCES	REVISIONS			PART NUMBER		
	NO	DATE	BY	CPI6		
UNLESS OTHERWISE SPECIFIED DECIMAL .XX ± 0.0 .XXX ± 0.0 ANGULAR ± DRAFT	1			PART NAME		
	2			VINYL CLOSURE		
	3			THOMSON	SCALE	NONE
	4			DATE	DATE	DATE
	5	127		TRACED	APP'D	APP'D
				SEE NOTE 1		
				DRAWING NO		
				ESP-C16		

**NOTES:**

**1. MATERIAL:**

PHOTOGRAPHIC PAPER.  
PRESSURE-SENSITIVE  
ADHESIVE BACKED WITH  
PROTECTIVE BACKING  
PAPER.



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290319

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP15		
XX ± .00		1			PART NAME		
XXX ± .00		2			LABEL, COLLECTOR		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
		5	128		SCALE FULL		
		6			DATE 14 Nov 76		
					SEE NOTE 1		
					ESP-C15		

# NOTES:

## 1. MATERIAL:

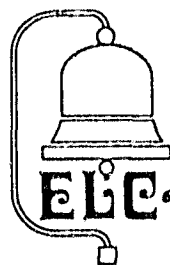
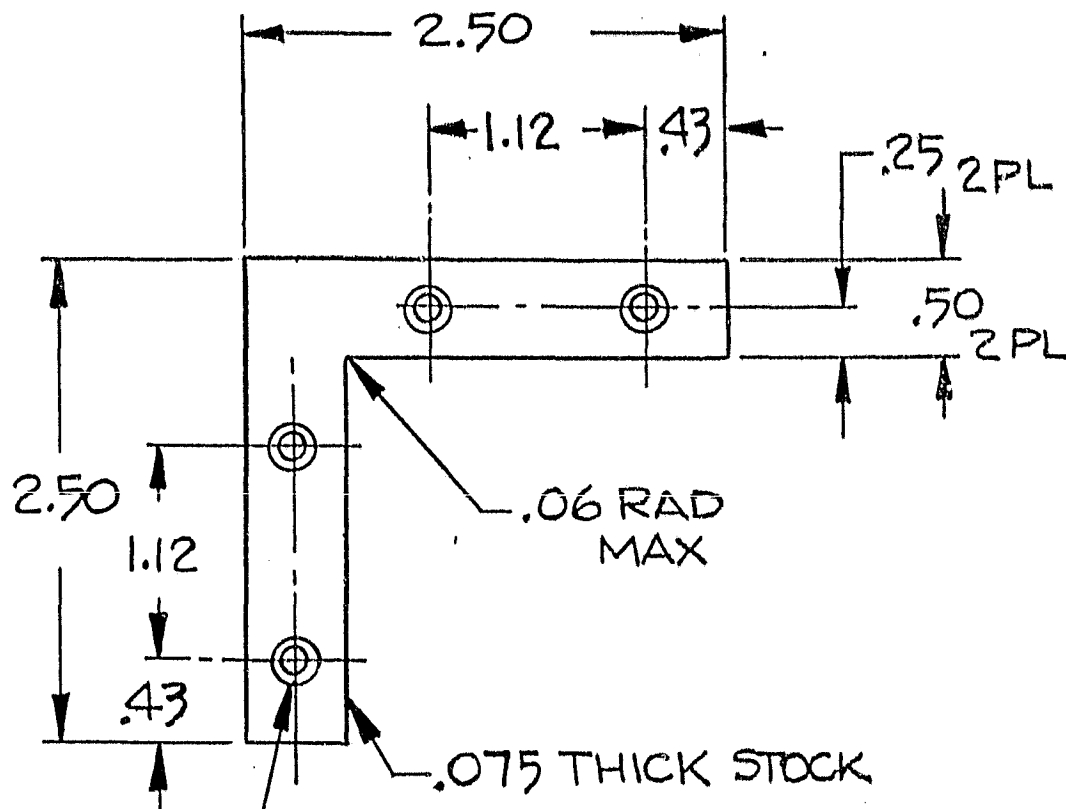
CARBON STEEL

## 2. PROTECTIVE FINISH:

ZINC PLATE

## 3. MFG PART NO.

STANLEY NO. 999



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8603

**ELCAM, INC.**

Contractors License No. 290399

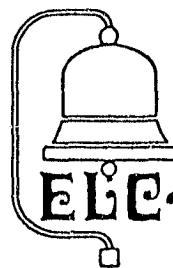
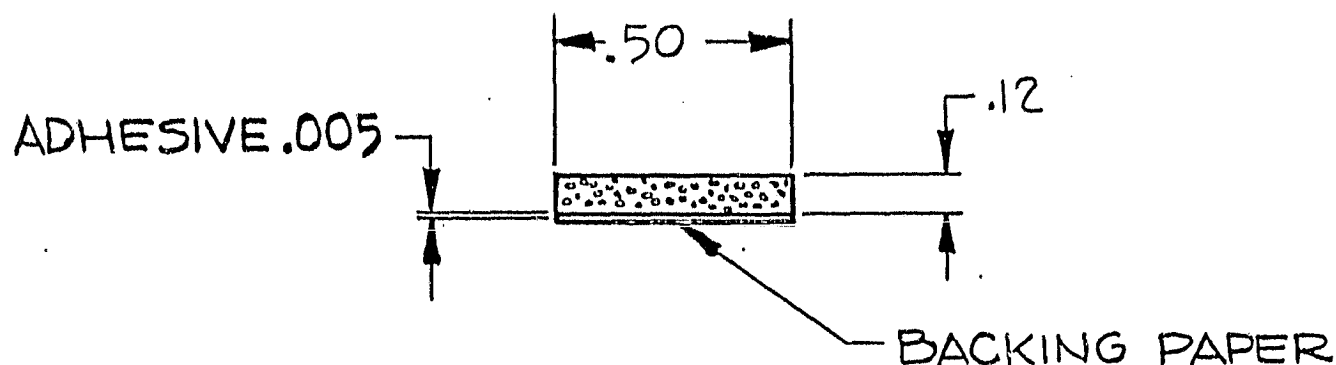
TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP 14		
.XX ± .00		1			PART NAME		
.XXX ± .00		2			CORNER BRACKET		
ANGULAR ±		3			DRAWN BY		
DRAFT		4			THOMSON		
		5	129		SCALE		
					FULL		
					DATE		
					14 NOV 76		
					MATERIAL		
					SEE NOTE 1		
					DRAWING NO		
					ESP-C14		



# NOTES:

## 1. MATERIAL:

VYNIL RUBBER STRIP.  
CLOSED CELL SPONGE  
DUROMETER 40-50  
COLOR BLACK. PRESSURE-SENSITIVE  
ADHESIVE BACKED WITH  
PROTECTIVE BACKING PAPER.



5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693

**ELCAM, INC.**

Contractors License No. 290399

TOLERANCES		REVISIONS			PART NUMBER		
UNLESS OTHERWISE SPECIFIED DECIMAL		NO	DATE	BY	CP7		
XX ± .00		1			PART NAME		
XXX ± .00		2			GASKET		
ANGULAR ±		3			DRAWN BY	SCALE	MATERIAL
DRAFT		4			THOMSON	NONE	SEE NOTE 1
		5	130		CHK'D	DATE	DRAWING NO
					TRACED	14 NOV 76	ESP-C7
						APP'D	

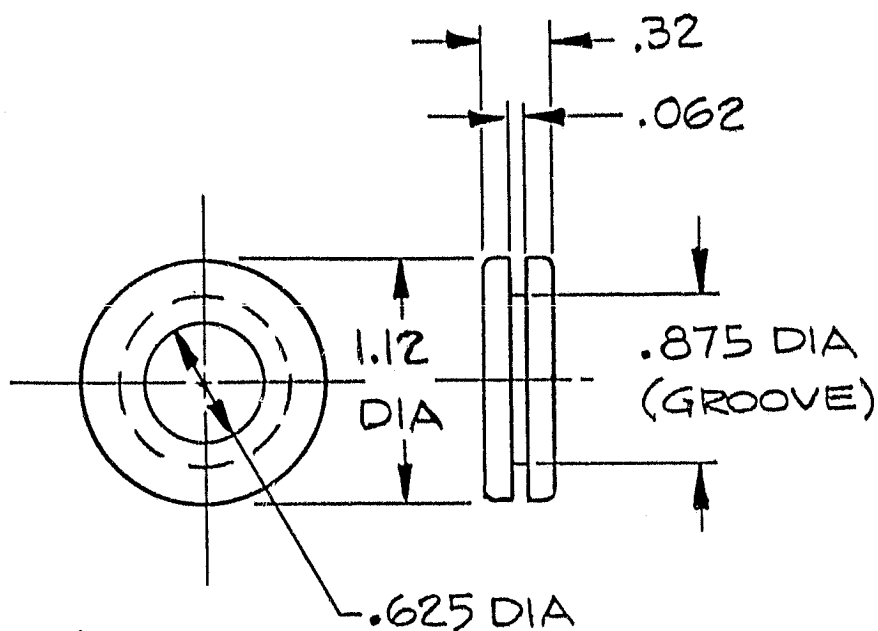
# NOTES:

## 1. MATERIAL:

RUBBER, SYNTHETIC  
COLOR BLACK

## 2. VENDOR(S)

RUBBERCRAFT

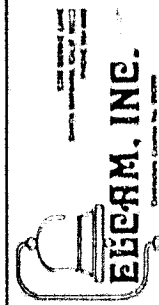


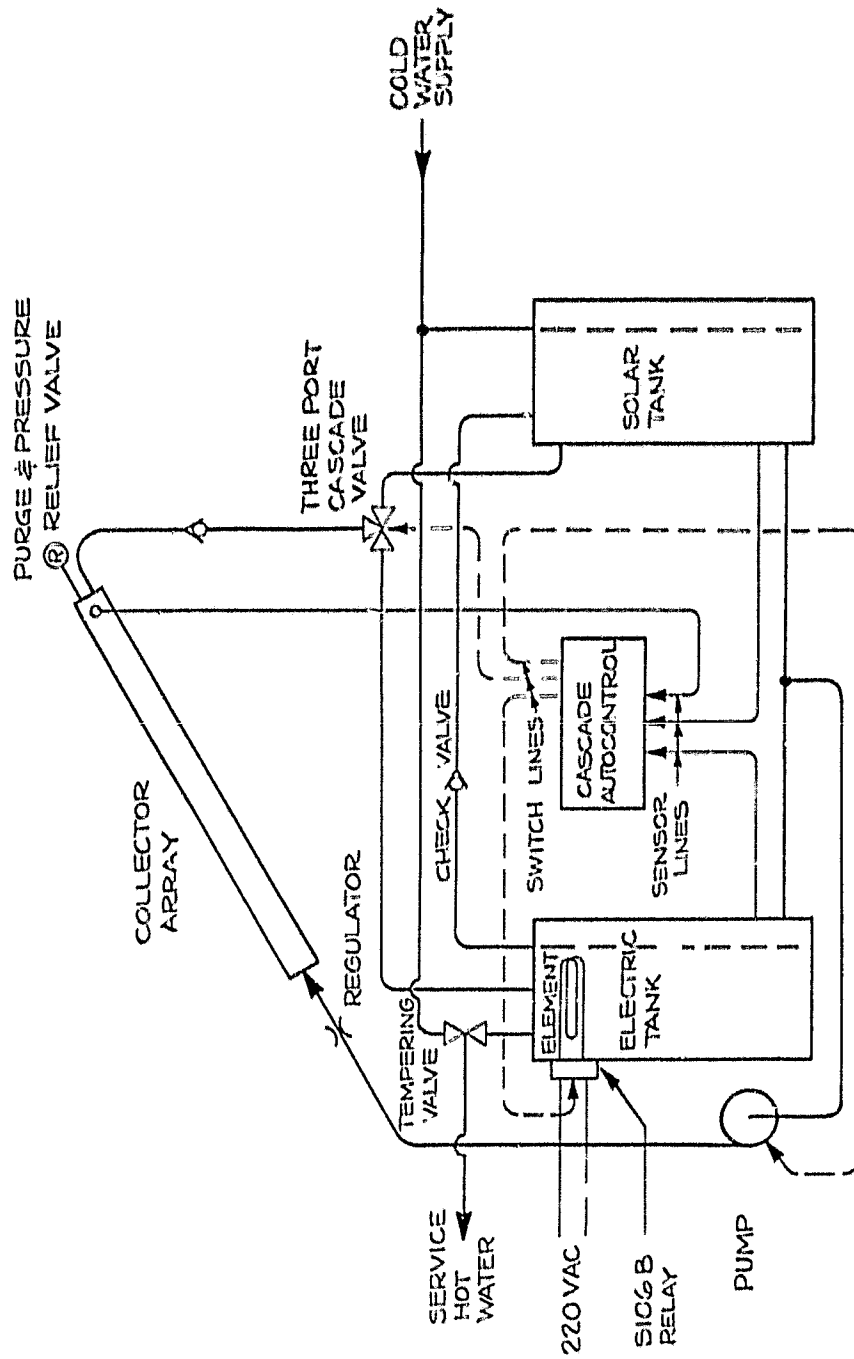
5330 DEBBIE LANE  
SANTA BARBARA, CALIF. 93111  
PHONE 964 8693


**ELEM, INC.**

Contractors License No. 290399

TOLERANCES	REVISIONS			PART NUMBER	
	NO	DATE	BY	CP10	
UNLESS OTHERWISE SPECIFIED DECIMAL .XX ± .00 XXX ± .001 ANGULAR ± DRAFT	1			PART NAME RUBBER GROMMET	
	2				
	3				
	4				
	5	131			
				DRAWN BY THOMSON	SCALE FULL
				CHK'D	DATE 14 NOV 76
				TRACED	APP'D
				MATERIAL SEE NOTE 1	
				DRAWING NO ESP-C10	

132





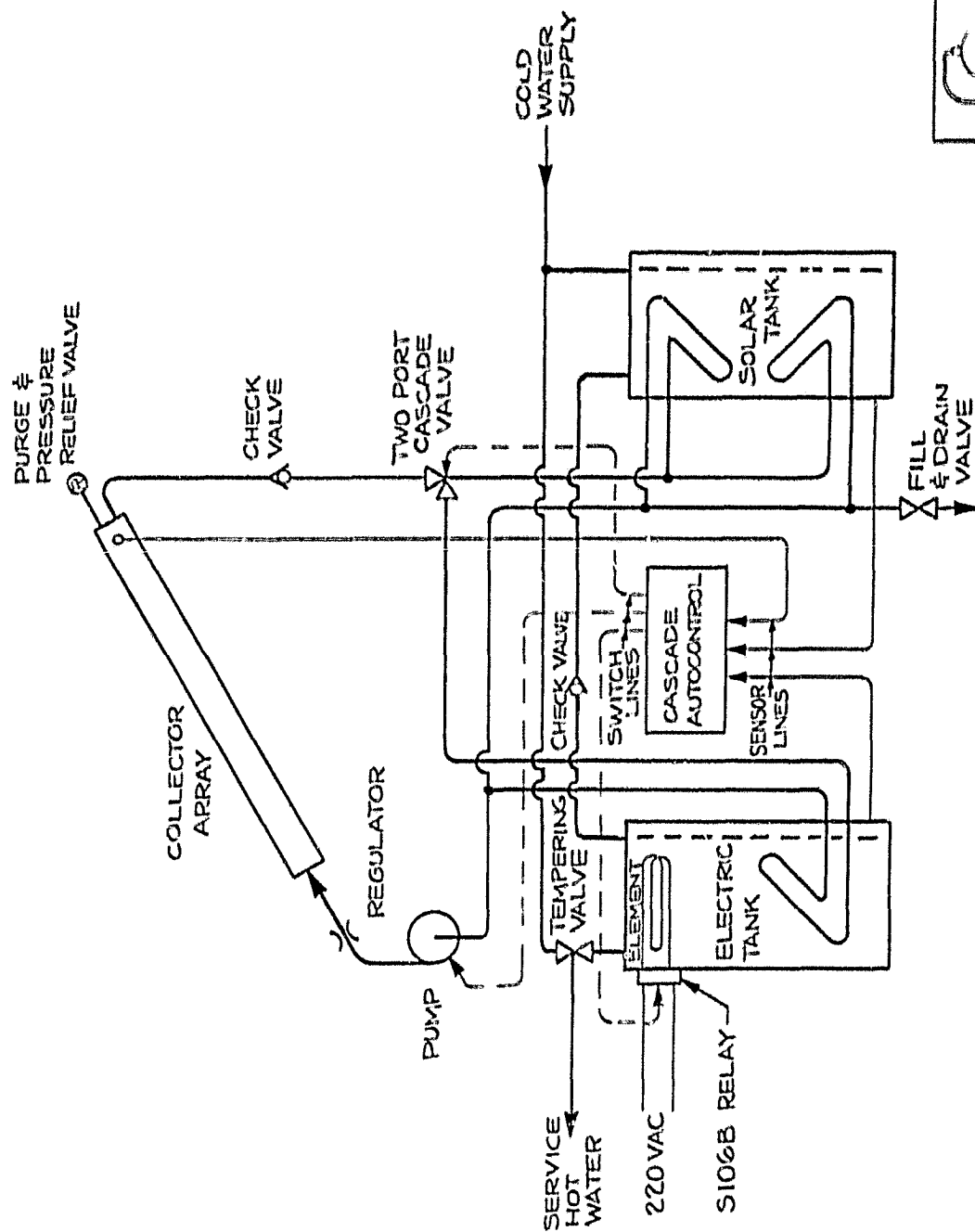
**ELEGAM, INC.**  
LIFE WATER - TIME TO DESIGN


SPECIFICATIONS		NOTES	
DATE	BY	DATE	BY

**DIRECT HEATING SYSTEM**

REVISED: 11/87

ESS-3

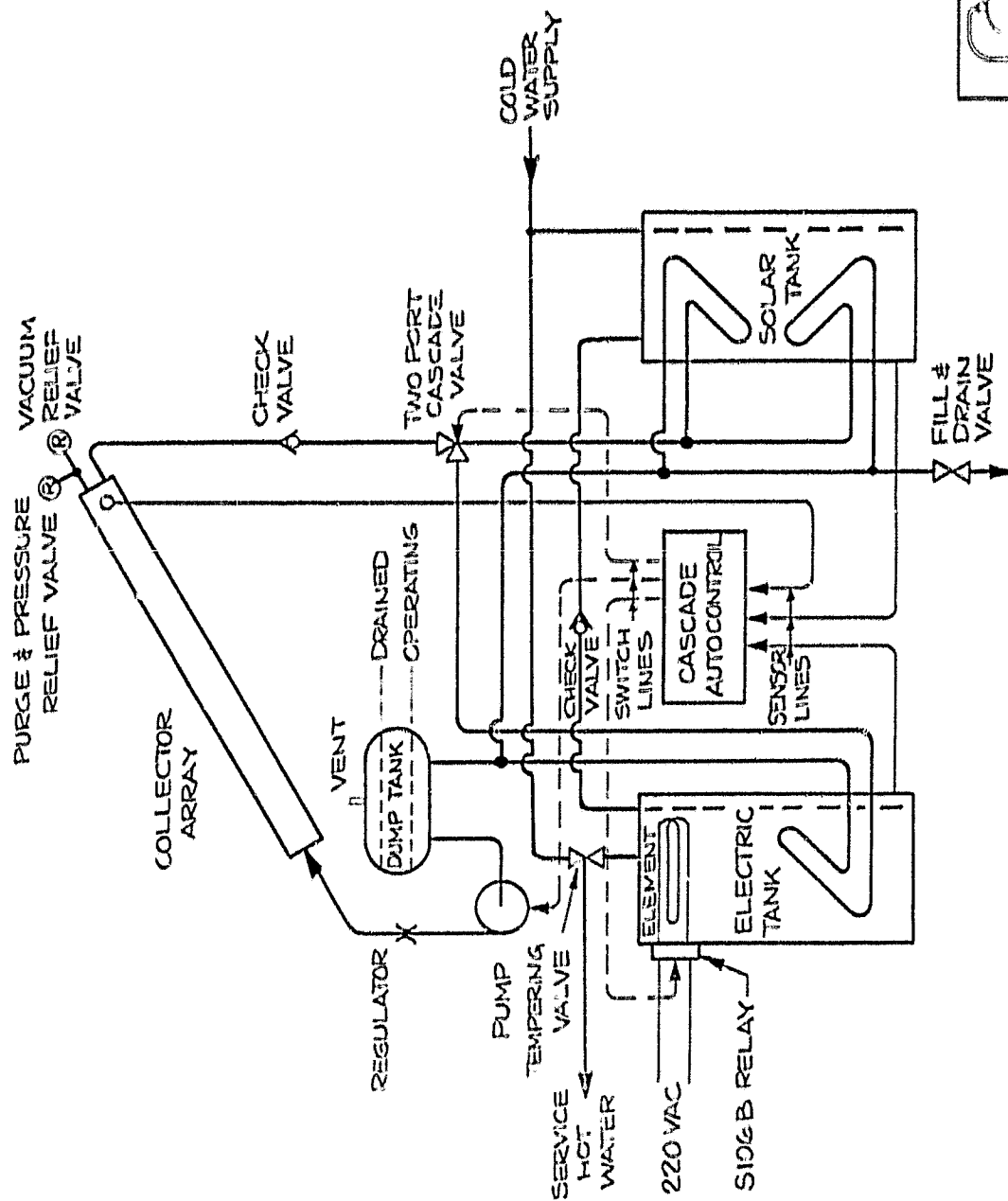





**ELIEM, INC.**

1000 W. 10th St.  
Tulsa, Oklahoma 74103

INTERNAL HEAT EXCHANGER	
MODEL NO. <b>ESS-1</b> SERIAL NO. <b>100000</b>	DATE <b>10/10/78</b> BY <b>W. J. HARRIS</b>



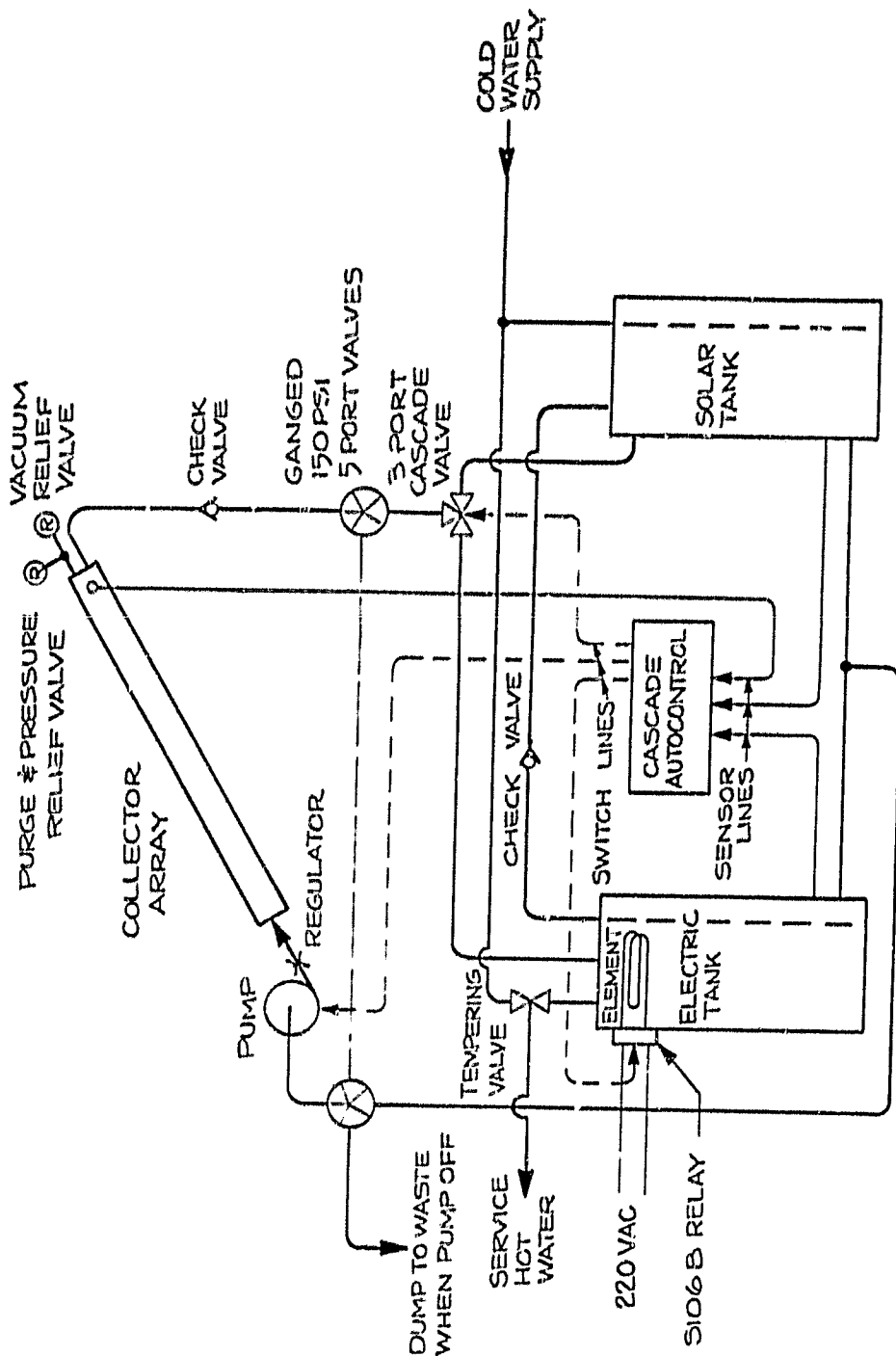



**Ebeam, Inc.**  
1000 S. 10th St. Suite 100  
 Phoenix, Arizona 85001  
 (602) 944-1111

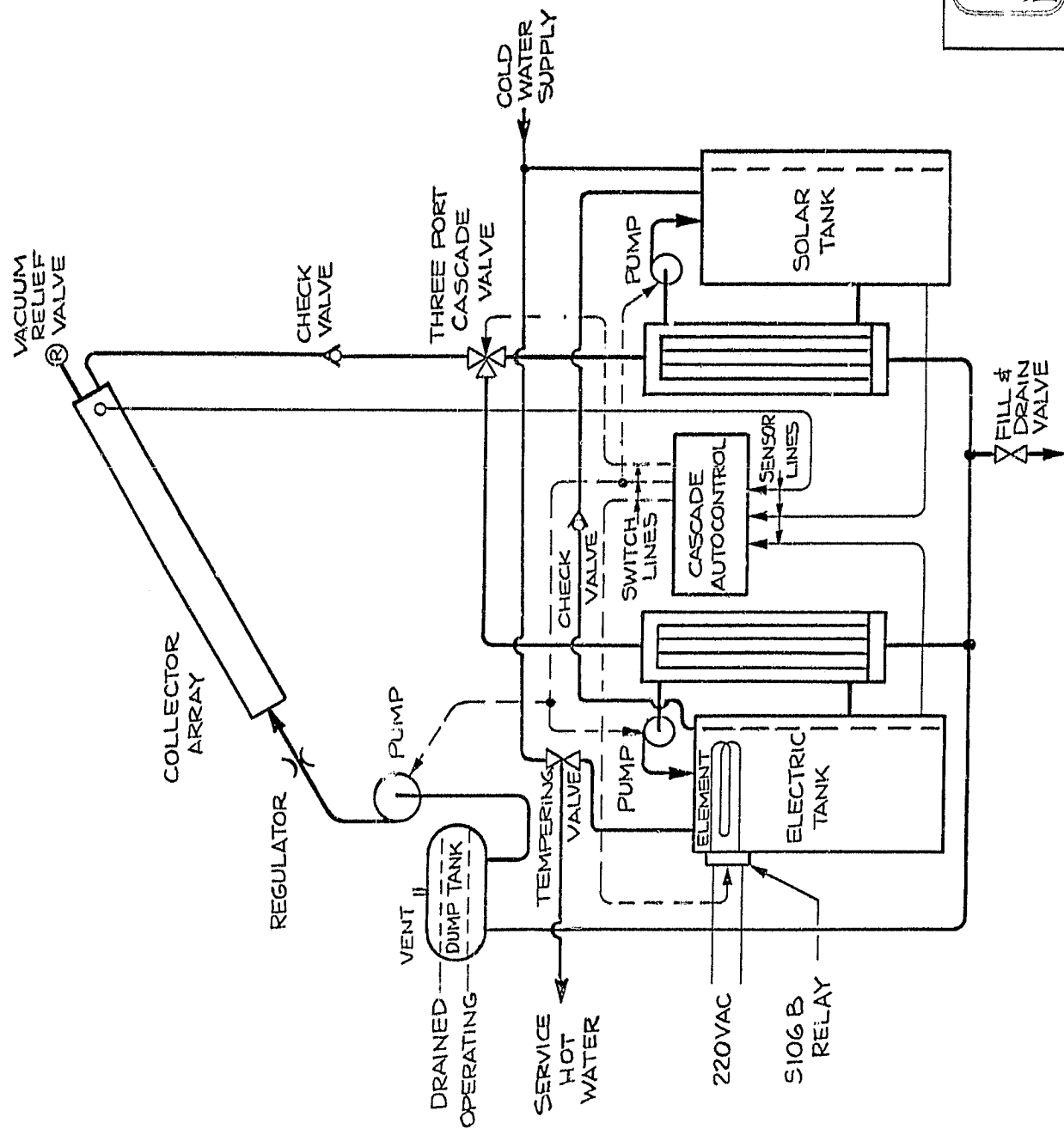
**DUMP TANK WITH  
INTERNAL HEAT EXCHANGER**

Model: **ESS-4**

Rev: **1.0**



 <b>EBERAM, INC.</b> <small>1000 E. 10TH AVE. SUITE 100 DENVER, CO 80202</small>		<b>DIRECT DUMP OPTION</b> MODEL NO. <b>SS-5</b> DATE <b>10/17/76</b>
PROJECT NO. _____ SPECIFIED BY _____ DESIGNED BY _____ CHECKED BY _____ DATE _____	NO. OF TANKS _____ NO. OF PUMPS _____ NO. OF VALVES _____ NO. OF RELAYS _____	NO. OF TANKS _____ NO. OF PUMPS _____ NO. OF VALVES _____ NO. OF RELAYS _____



11000 LANE  
SANTA ANITA, CALIF. 92083  
PHONE (714) 255-1100

**ELEGAM, INC.**  
California 11000 LANE

COMPONENTS: 11000 LANE

11000 LANE  
SANTA ANITA, CALIF. 92083  
PHONE (714) 255-1100

11000 LANE  
SANTA ANITA, CALIF. 92083  
PHONE (714) 255-1100

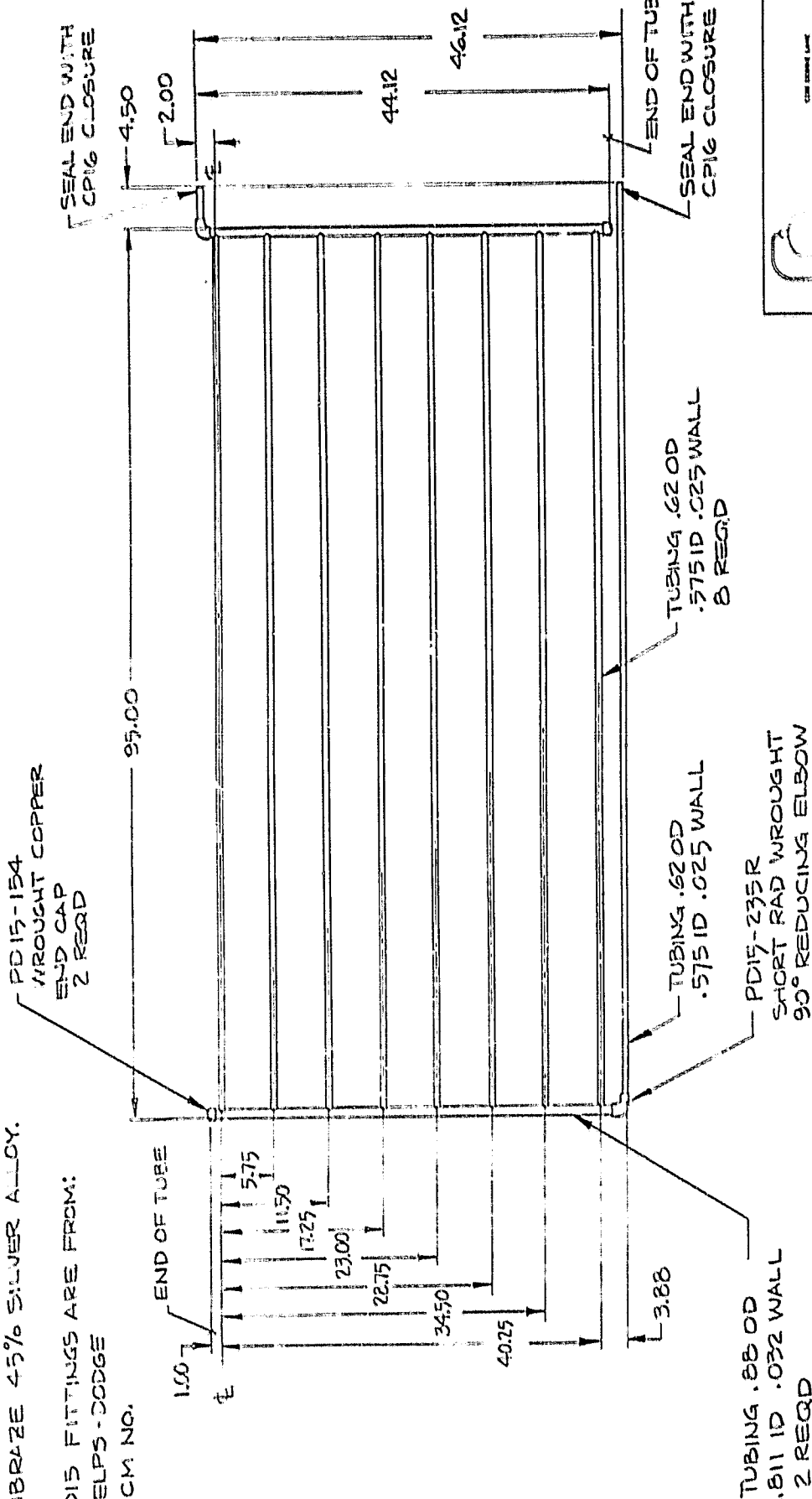


## 1. MATERIAL:

2. ALL SEAMS SHALL BE BRAZED USING UNIBRAZE 45% SILVER ALLOY.

- PD 15-154  
WROUGHT COPPER  
END CAP  
2 REQD

3. PD15 FITTINGS ARE FROM:  
PHELPS - DODGE  
PSCM NG.



THESE THINGS ARE  
NOT TO BE TAKEN  
SERIOUSLY

# WABAM INC.

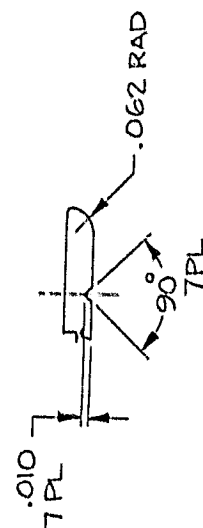
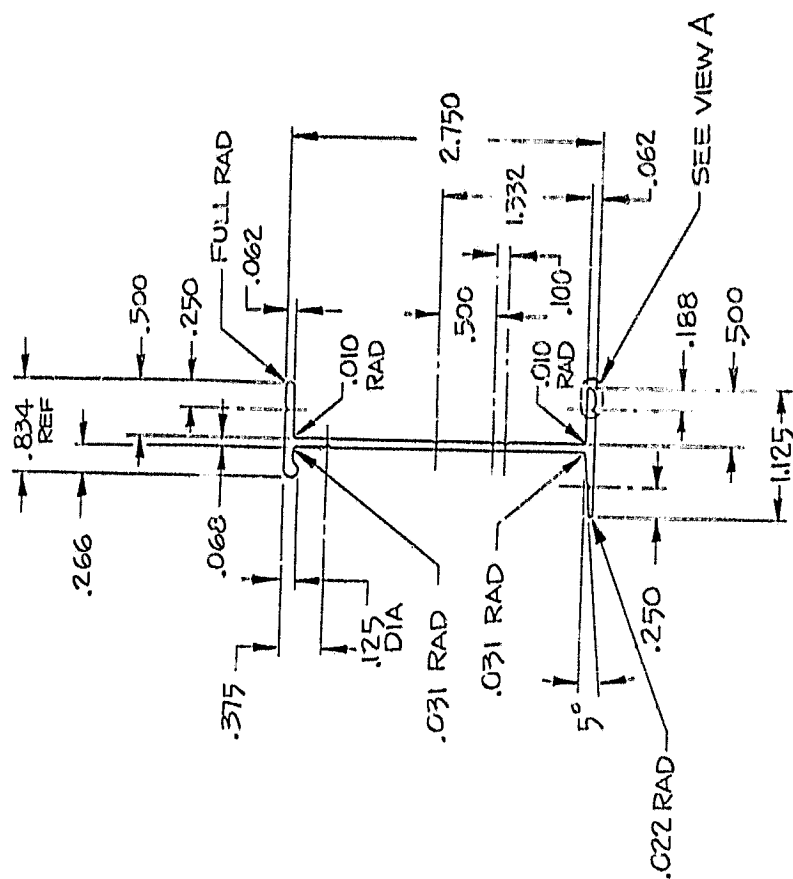
TO/FR/TYPE	DATE/TIME	STATUS	REMARKS
UNCLAS	1982-01-06	1	CP2
UNCLAS	1982-01-06	2	ABSORBER WATERWAY
UNCLAS	1982-01-06	3	CAUTION -- NO FREEZING
UNCLAS	1982-01-06	4	ALERT 16
UNCLAS	1982-01-06	5	ESQ-C2

### 1. MATERIAL:

2. VENDOR:

REYNOLDS METALS CO.  
FSC# NO.

DETECTIVE BUSH:  
ELECTRO-DEPOSITED  
COMMERCIAL DARK  
BROWN



VIEW A  
SCALE: 4/1



# ELCOM, INC.

UN

10-2410 (H  
(S)

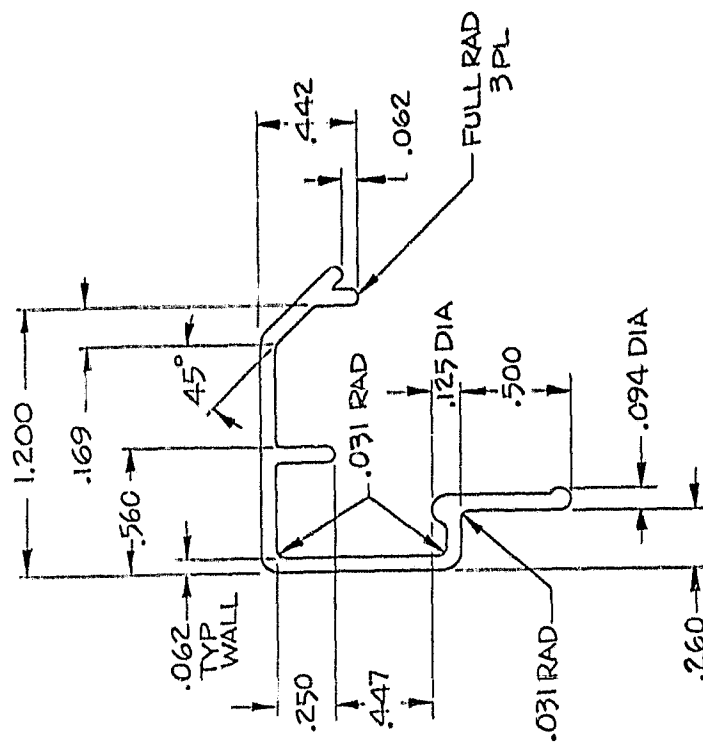
[illegible]

NOTES:

1. MATERIAL:  
ALUMINUM ALLOY EXTRUSION  
CMP5N 6063 TEMPER T6  
DIE SECTION NO. 67025

2. VENDOR:  
REYNOLDS METALS CO.  
FSCM NO.

3. PROTECTIVE FINISH:  
ELECTRO-DEPOSITED  
COMMERCIAL DARK  
BROWN



2100 GERRARD AVE.  
SCARBOROUGH, ONTARIO  
M1V 4Y7

Ebeam, Inc.

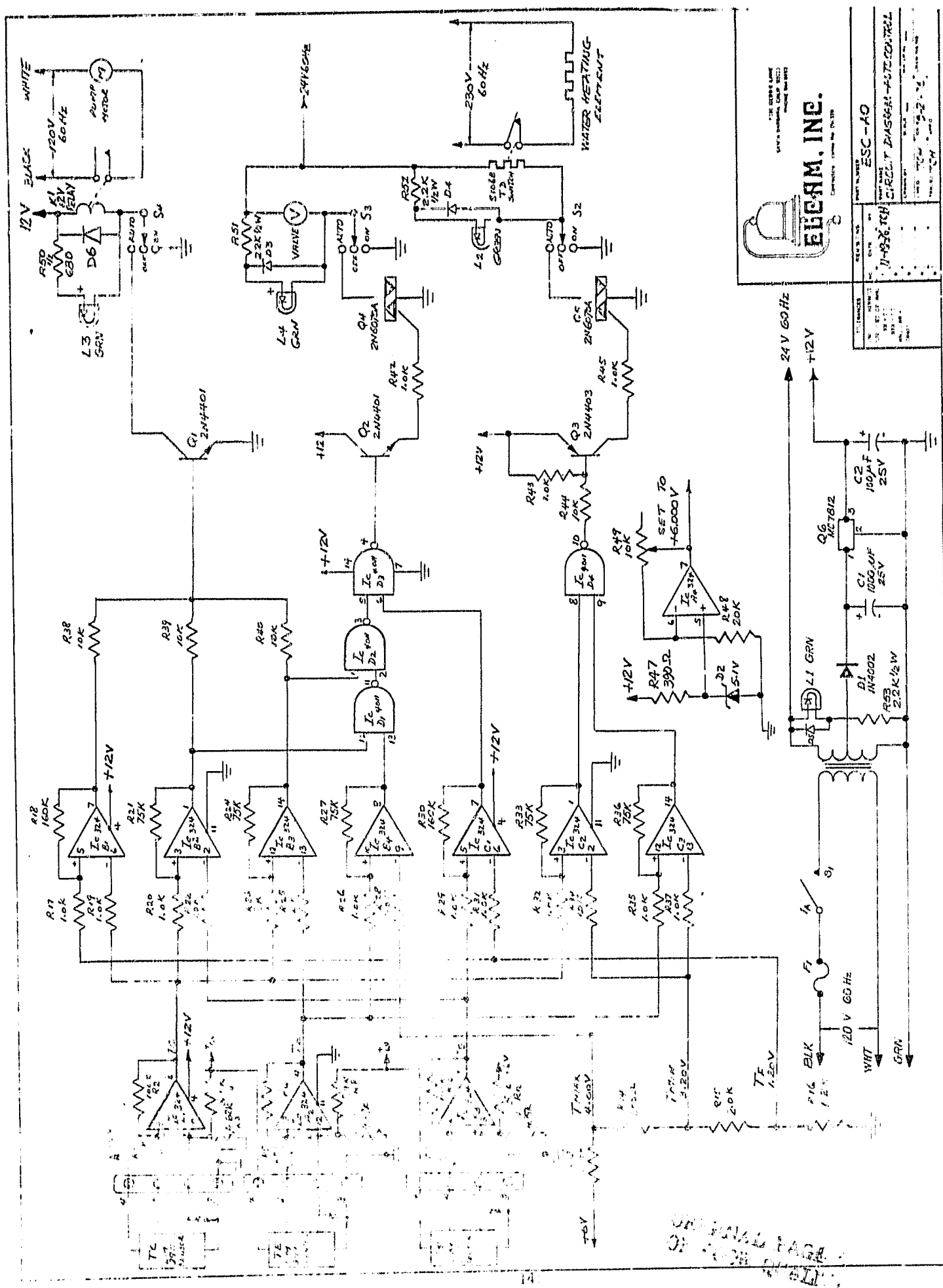
Corporation Canada No. 27039

REVISIONS	DATE	BY	REASON
1			INITIALS
2			DATE
3			BY
4			DATE
5			BY
6			DATE
7			BY
8			DATE
9			BY
10			DATE
11			BY
12			DATE
13			BY
14			DATE
15			BY
16			DATE
17			BY
18			DATE
19			BY
20			DATE
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98			DATE
99			BY
100			DATE

CP4

COVE STRIP

2/1 SEE DETAIL  
ESP-04



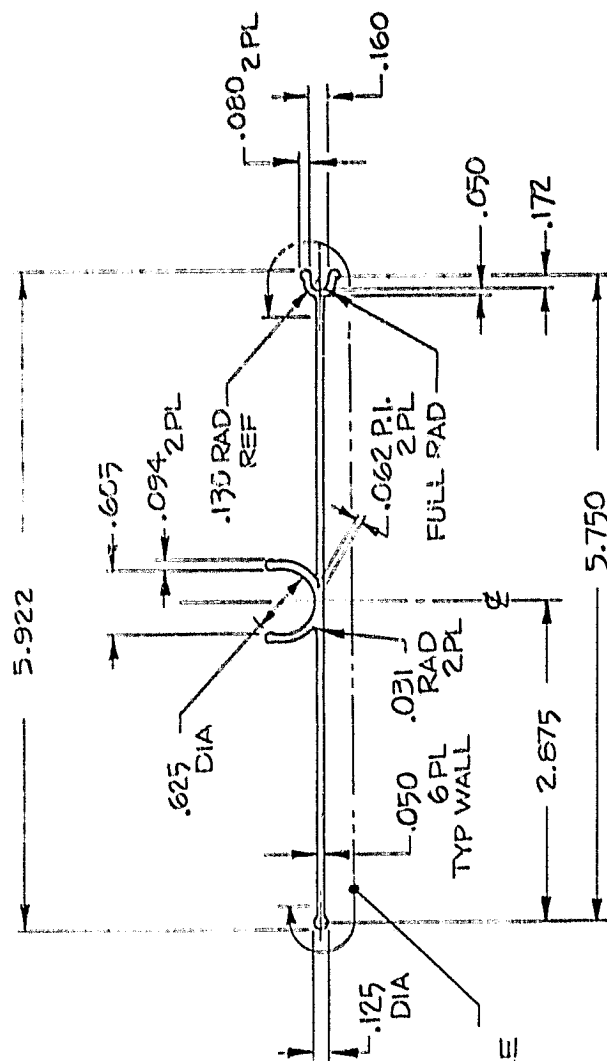
NOTES:

1. MATERIAL:  
ALUMINUM ALLOY EXTRUSION  
CMPEN 6053 TEMPER T5  
DIE SECTION 66890

2. VENDOR:  
REYNOLDS METALS CO.  
FSCM NO

3. PROTECTIVE FINISH:  
CHEM FILM (ALODINE) ENTIRE  
PART, FINISH COAT WITH MERTIN 10.23  
(ALTERNATE BLACK, ON  
INDICATED AREA.

BLACK  
FINISH THIS  
SURFACE, SEE  
NOTE 3



ELCAM, INC.  
CORPORATION  
10000 WILSON BLVD  
LOS ANGELES, CALIF 90024

REVISIONS	DATE	BY	APP'D	REASON
1				INITIAL
2				REVISION
3				REVISION
4				REVISION
5				REVISION
6				REVISION
7				REVISION
8				REVISION
9				REVISION
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96				REVISION
97				REVISION
98				REVISION
99				REVISION
100				REVISION

NOTES:

1. MATERIAL:  
ALUMINUM ALLOY EXTRUSION  
CMPSN 6063 TEMPER T5  
DIE SECTION NO.

2. VENDOR:

3. PROTECTIVE FINISH:  
ELECTRO-DEPOSITED  
COMMERCIAL DARK  
BROWN

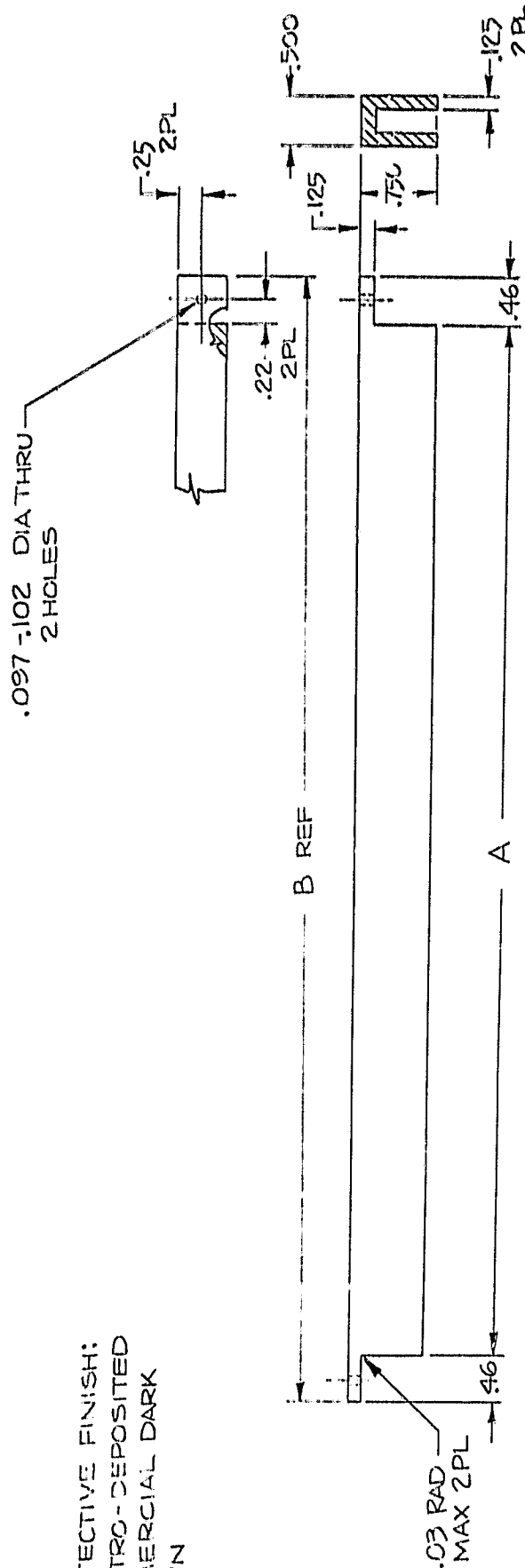
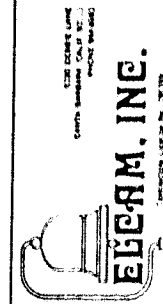


TABLE I

PART NO.	NOTCHED LENGTH A	CUT LENGTH B REF	REMARKS
CP5-001	47.38	48.30	



PART NO. CP5	
CROSS CHANNEL	
SECTION: 1	
DATE: 3/24/76	
BY: ESP-C5	

NOTES:

1. MATERIAL:

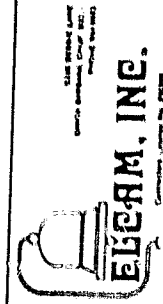
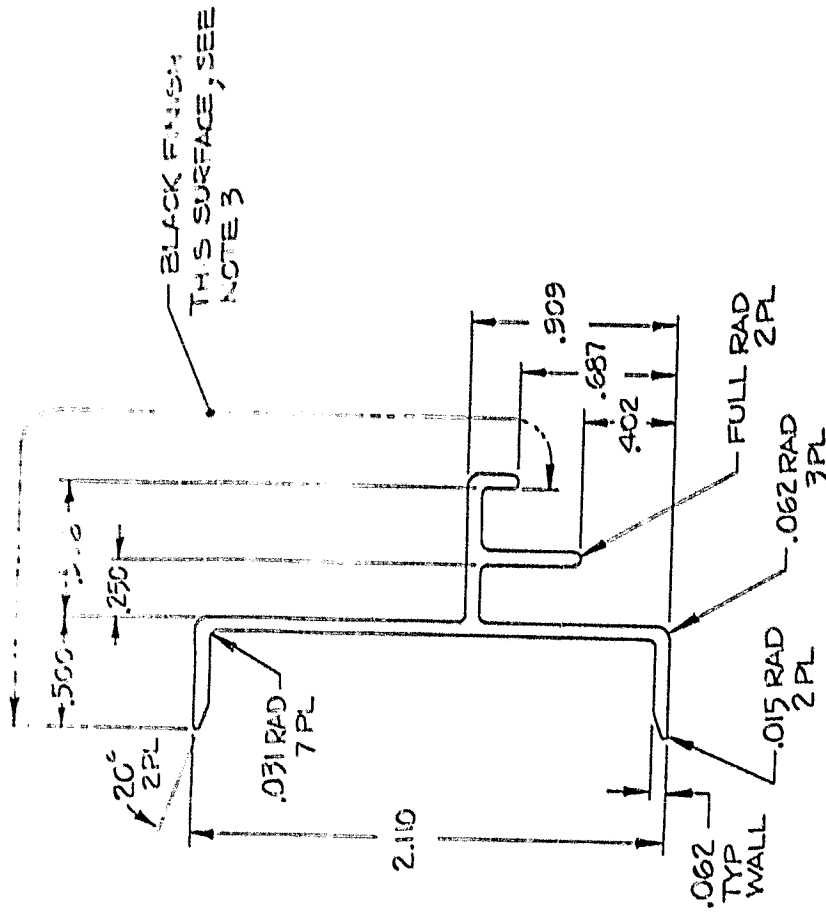
ALUMINUM ALLOY EXTRUSION  
CMPN 6063 TEMPER T5  
DE SECTION NO. 67108

2. VENDOR:

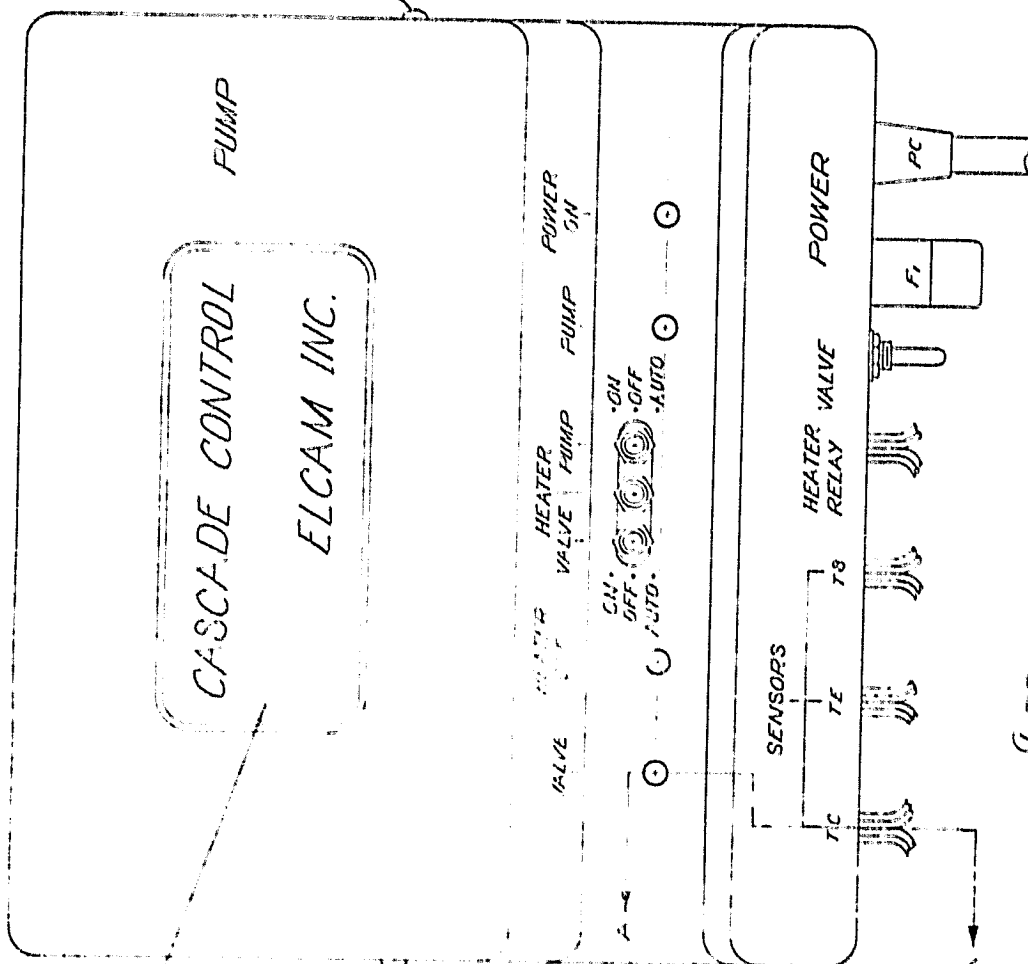
REYNOLDS METALS CO.  
FROM NO.

3. PROTECTIVE FINISH:

CHEM FILM (ALCO NEJENTRE PART,  
COAT INDICATED AREA WITH  
PARTIN NO. 4 (LUSTERLESS BLACK)  
AIR DRY.

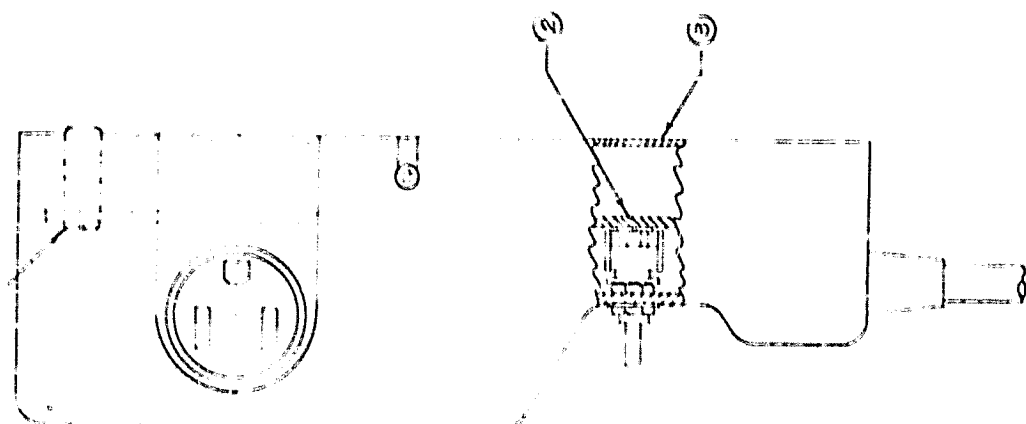


DESIGN NO.	CP6
DATE	
BY	
CHECKED	
APPROVED	
PROJECT	ABSORBER RESTRAINT
REVISION	2/1 SEE NOTE 1
DATE	11/1/66
BY	W. J. ESP-06



ITEM PART NO.	DESCRIPTION	QTY
1	Y5280-2 COVER	1
2	Y5280-2A CIRCUIT BOARD ASSY	1
3	Y5280-4 BASE PLATE	1
4	Y5280-41 SPIND OFF	5
5	Y5280-40 SCREW	5
6	23-0708-0 SCREW	2
7	Y5280-50 LOGO	1

SECTION A-A



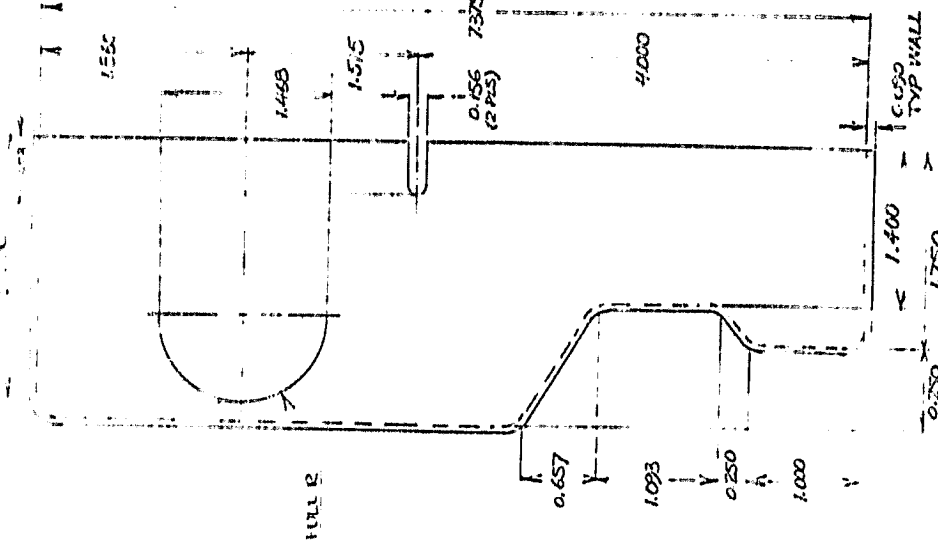
**ELCAM, INC.**

15714 KILL ASSEMBLY

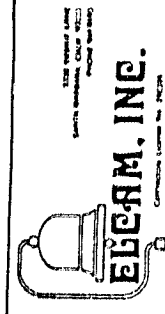
9-28



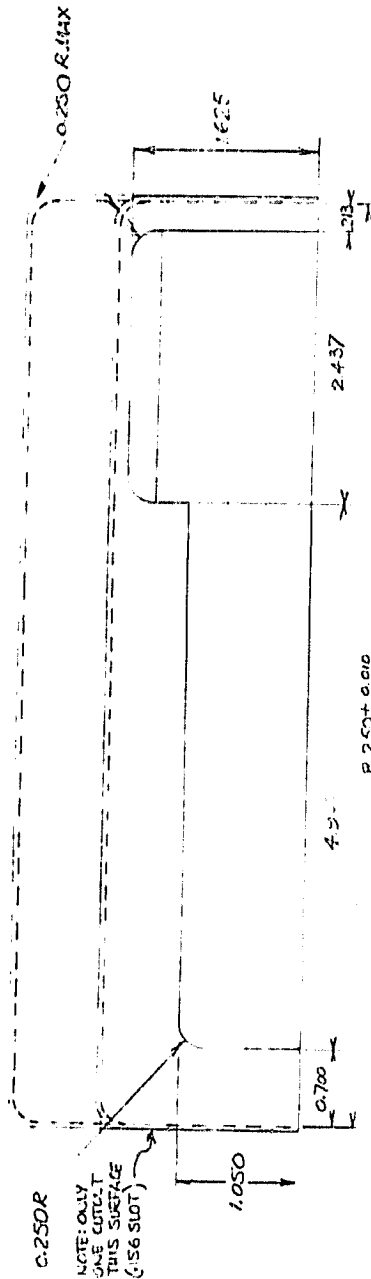
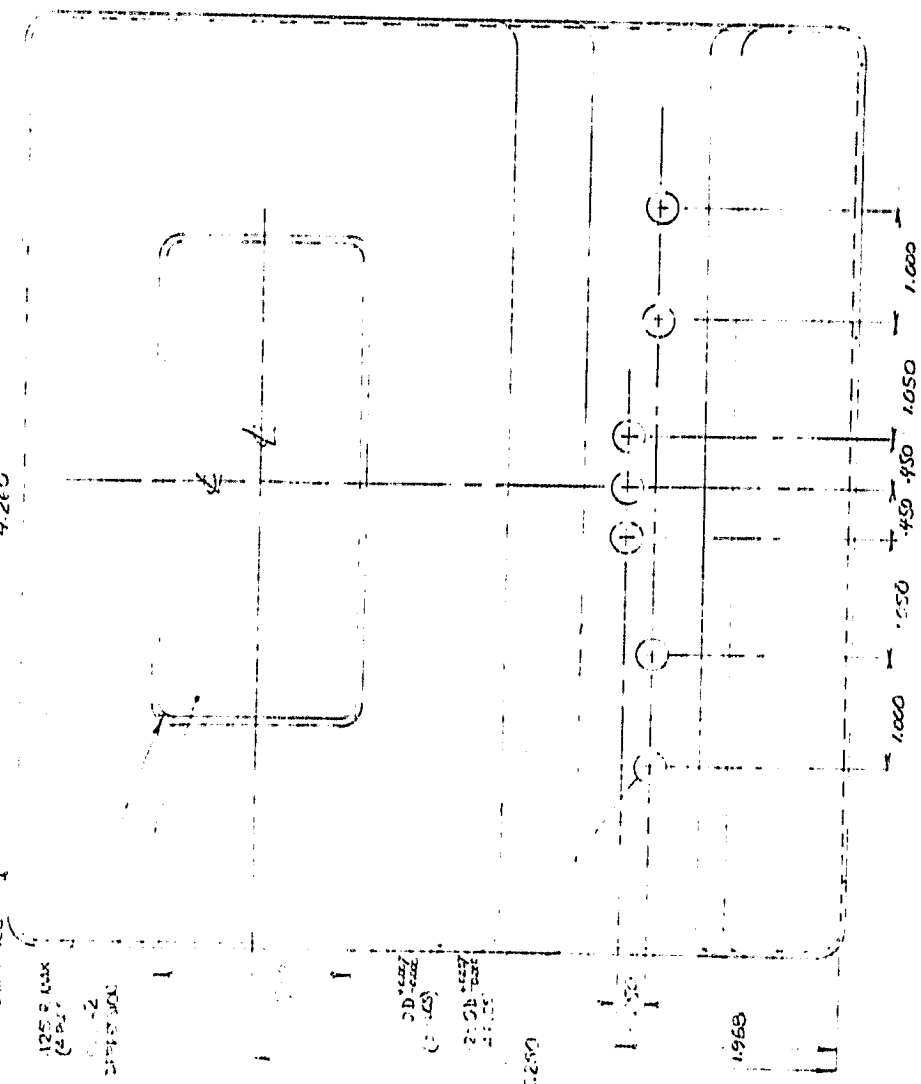
ORIGINAL PAGE IS  
OF POOR QUALITY



- ② COLOR: BLACK
- ① FINISH: HAIRCELL



ITEM NO.	DESCRIPTION	QTY
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1
ESC-A2	COVER - AUTOCOR TALL	1



NOTE: ONLY  
ONE CUTOUT  
THIS SURFACE  
(156 SLOT)